FOOD CONSUMPTION PATTERNS: EMPIRICAL EVIDENCE FROM ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) DATA

By

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To my parents and my husband

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FOOD CONSUMPTION PATTERNS: EMPIRICAL EVIDENCE FROM ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) DATA

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The development of the international comparison project data has provided invaluable inputs toward a recent widespread demand for international comparison studies. The use of purchasing power parities as conversion factors in the international comparison project data has proved to be useful. However, the quality of the international comparison project data has become a concern. Major problems stem from the lack of funding and the imposition of the fixity principle to the data. Meanwhile, the Organisation for Economic Co-operation and Development has launched its own edition of the purchasing power parities converted data for its member countries. These data, on the other hand, are not subjected to the fixity principle and the survey runs more frequently, providing the most recent data possible to researchers.

The primary goal of this present study is to provide the estimates of demand elasticities using the cross-country data from the Organisation for Economic Co-operation and Development between 1985 and 1999. The estimated demand elasticities are useful for economists and policy makers in preparing demand forecasts and policy analyses. The secondary goal is to investigate food consumption patterns across time. Based on a two-stage budgeting framework, two extended versions of the Working's model were fitted to the cross-country and the pooled data. The evidence confirms that consumers in the lower income level allocate a larger proportion of their income to food, beverages, and tobacco than do consumers in the higher income level. In contrast, consumers in the higher income level spend more on luxuries, such as medical care, in our study. Food away from home is the most conditionally income elastic food item. Overall, consumers in the lower income countries are more sensitive to income and price change than are consumers in the higher income countries.

CHAPTER 1
INTRODUCTION

The Organisation for Economic Co-operation and Development (OECD) is the international organization of the industrialized, market-economy countries, which provides governments a setting in which to discuss, develop, and perfect economic and social policies. The OECD was previously known as the Organisation for European Economic Cooperation (OEEC), which was initiated to manage American and Canadian aid under the Marshall Plan for the post-war reconstruction of Europe (OECD, 2003a). In 1961, the OECD was formed with 19 original member countries from Europe and North America. The number of member countries has continually increased, reaching 30 countries in 2000. The Slovak Republic was the last country to join OECD.

Current OECD member countries include Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States. These 30 member countries provide two-thirds of the world's goods and services (OECD, 2003a). The OECD has also reached out to 70 non-member countries in developing regions and emerging markets to provide its expertise and to cooperate with these countries in understanding the challenges of globalization issues.

Food demand is expected to change for these countries in response to changes in real income and relative prices. With increasing purchasing power, consumers are now shifting towards higher value-added foods such as pre-prepared foods (OECD, 2002b). As a consequence, changing income and price have affected the composition of the demand for food and its characteristics.

Blandford (1984) analyzed trends in food consumption patterns in the OECD area between 1960 and 1980. He suggested that per capita food consumption is becoming less responsive to changes in income. By comparing per capita daily caloric consumption of food between 1960-1961 and 1979-1980, he observed an increase in total caloric food consumption in the OECD countries (except Finland and New Zealand). He expected a slow growth in aggregate food consumption as a result of slow future population growth in most of the OECD countries. In addition, he pointed out that the share of animal products in total food consumption tends to stabilize as the dietary structure across the majority of the OECD countries becomes more similar.

Cranfield et al. (1998) studied the change in global food demand patterns using cross-sectional data from the fifth phase (Phase V) of the International Comparison Project (ICP) data. They predicted that, by 2020, food expenditure will increase, while the expenditure share of food will decrease. They projected changes in expenditures within the food category, including a shift from grains towards livestock products in low-income countries.

A case study on household food consumption, by OECD sector (OECD, 2002b), pointed out a change in demand for different food products in the OECD countries has occurred over the past three decades. This case study investigated household food consumption in four OECD countries (Austria, Poland, Sweden, and United States). It indicated a higher trend toward consumption of meat (except Poland), cheese, fruits, vegetables, processed food, and bottled drinks, and a decline in food expenditure share in most of the OECD countries.

The demand for forecasting food demand has become significant for policy analysis in both developed and developing countries. It is now a common practice for policy makers to use these types of projections as guidelines for evaluating future policy issues. Projections of demand for food as well as studies in food security are the major topics of interest. The ability to project demand for food accurately ensures that policy makers have the best information for making future food and trade policies and for achieving nutritional goals. In general, projections employ simulation models such as the financial programming/revised minimum standard model (RMSM) framework and the computable general equilibrium (CGE) model as tools in the projection process. While the RMSM framework is widely used in accounting, the CGE model is used in the studies of economic impact and welfare analysis. In addition, one of the most common inputs to the CGE model is demand elasticity. In practice, demand elasticities are taken from related literatures or econometric studies.

In order to obtain demand elasticities, a detailed study of demand systems is required. Many demand models have been developed in the past. The linear expenditure system (LES) was first estimated by Stone (1954), where he analyzed British demand patterns between 1920 and 1938. In spite of its simplicity, the system does not allow the presence of inferior goods and the obtained marginal shares do not vary with income level. Nevertheless, the work by Stone has paved a path for the development of many well-known demand models such as the Rotterdam model (Barten, 1964, and Theil, 1965); the translog model (Christensen et al., 1975); the almost ideal demand system

(AIDS) by Deaton and Muellbauer (1980a); the Florida Preference Independence (Florida PI) model and the Florida Slutsky model (Theil et al., 1989); and an implicitly, direct additive demand system (AIDADS) by Rimmer and Powell (1996).

One of the most challenging topics in demand analysis is in the context of international consumption comparisons. Houthakker (1957) compared elasticities for four groups of goods (food, housing, clothing, and other items) of 30 countries using the double-logarithmic function. Due to the limitation of the data, developing countries were not included in the analysis. The results showed that income elasticities did not vary greatly across countries. In fact, income elasticities of demand for food ranged from 0.34 to 0.73. Houthakker (1965) employed the household consumption data of 13 OECD countries between 1948 and 1959 using a double-logarithmic function. Purchasing power parities (PPPs) developed by the German Statistical Office were used to convert expenditure data to a common basis so that consumption comparisons across countries were plausible. In addition to comparing the estimations from the within countries regression and from the between countries regression, Houthakker also presented the estimates for the individual countries and for all 13 countries combined. Although, in some cases, the estimates of price elasticities were inconclusive when comparing between individual countries results and combined countries results, it was advised that the estimation obtained from combining the data from different countries might be helpful when data became limited.

Parks and Barten (1973) incorporated the impact of population levels into their international demand analysis using 14 countries from the OECD data between 1950 and 1967. Per capita consumption levels were found using the population functions instead of the population levels. They defined their population functions as being homogeneous of degree one in the numbers of people in each age category (Parks and Barten, 1973). The modified LES was fitted to the data and estimations were performed for each country using the time-series data. In order to make a comparison in the cross-country demand, the 1963 exchange rates obtained from the International Monetary Fund were used as conversion factors for all expenditure data. The results showed a strong population impact to the consumption patterns, especially the demand for food, clothing, and housing.

Lluch and Williams (1975) employed the extended version of the LES in their cross-country demand study. Their aim was to test whether it is acceptable to replace personal disposable income with total consumption expenditure in the cross-country study. The results ascertained the use of personal disposable income in the cross-country demand patterns. In addition, the cross-country results suggested that the own-price elasticity of the demand for food (in absolute value) and the cross-price elasticities with respect to the price of food (in absolute value) declined as the gross national products per capita increased.

Theil and Suhm (1981) employed the 1970 ICP data covering 16 countries to develop a cross-country demand system. In their study, they incorporated a substitution term into Working's model (Working, 1943). Preference independence was assumed such that consumer's preferences were represented by an additive utility function. Of all eight goods, income elasticities showed that food was the only necessity in all countries and medical care was the most luxurious good. They also suggested an inverse relationship between income elasticities and income levels.

The most comprehensive work in the area of international consumption comparisons is that of Theil et al. (1989). They derived new demand systems (Florida PI model and Florida Slutsky model) by extending Working's model (Working, 1943) using the differential approach to consumer demand. The attractive features of their study include not only the development of two new cross-country demand systems but also the extensive use of the ICP data. Data from Phase II (1970), Phase III (1975), and Phase IV (1980) of the ICP data were employed in the estimations of 10 broad consumption groups, including the food group. Observations included countries with different levels of income. In addition to fitting the Florida PI model to each phase individually, the study pooled data and obtained pooled estimates of the cross-country and the time-series data. Overall, the results confirmed that food was a necessity (an increase of the demand for food by less than 1%, given a one percentage increase in total income). However, the main focus of their study was on the international consumption evidence of aggregated goods obtained from the Florida PI model. Although a general discussion of the Florida Slutsky model was provided in their work, implementation of the Florida Slutsky model was not fully pursued.

Significance of the Research

The main focus of this dissertation is to provide estimates of demand elasticities which can be widely used as inputs to simulation models to predict potential future demand. Furthermore, these demand elasticities can be used in the partial equilibrium models for commodity markets. In fact, partial equilibrium models are models that equate supply and demand in one or more markets so that the markets clear at the equilibrium price levels (World Bank, 2003). Additionally, policy parameters (such as an introduction of tariff or quota) can be included such that the impact of changes in policies can be addressed. An example of the partial equilibrium model used by the OECD is the AGLINK model. The OECD uses the AGLINK model to provide a medium-term assessment of future trends and prospects of markets for agricultural products traded by OECD countries and to provide estimates of supply, demand, and prices (OECD, 2003b). Demand elasticities are used in these models to formulate demand functions. Our estimated demand elasticities include both income and own-price elasticities of demand for broad consumption groups (food, beverages, and tobacco; clothing and footwear; gross rent, fuel, and power; house furnishings and operations; medical care; transport and communications; recreation; education; and other expenditures) and for food subgroups (cereals and bread, meat and fish, dairy, fats and oil, fruit and vegetables, other foods, beverages and tobacco, and food away from home).

In addition, these demand elasticities can be further used to investigate consumption patterns among different countries. A better understanding of consumption patterns within the region would assist policy makers in forecasting food demand and making necessary adjustments to the policy that will best fit changing food consumption. Previous studies were often limited by the availability and the quality of the data that are comparable across countries. In fact, the differences in real incomes per capita across countries affect the accuracy of the estimated demand elasticities. Because inter-country comparisons of national accounts aggregates based on exchange rates as the conversion factors deviate substantially from comparisons based on the purchasing power of currencies, the availability of the ICP data originated by Kravis et al. (1982) provides valuable information towards cross-country demand studies. The ICP data by Kravis et al. (1982) were considered the best source of consumption data on a large number of countries and goods because it used PPP as a conversion factor instead of the official exchange rate. In addition, the ICP international prices and expenditures are reported at a disaggregated level and are comparable across countries.

Although ICP data have been employed extensively in many studies (Theil and Suhm, 1981; Theil et al., 1989; Seale et al., 1991; and Cranfield et al., 1998), the data are not without flaws. For instance, a study by Theil et al. (1989) revealed that the food consumption data for poor Africans were underreported. Even though the ICP data provide a large database for many countries from many regions of the world, the officially reported ICP data impose the fixity principle such that the rank of the European Union (EU) member countries remains unchanged regardless of what other countries are added to the sample. The fixity principle poses serious problems to international demand analysis as the subcategories of a good do not sum to category headings (Seale, 1998). On the other hand, OECD data with the Geary-Khamis (GK) aggregation are not subjected to the fixity principle. Thus, the GK aggregation version of the OECD data will give a better framework for a cross-country demand study. Like the ICP data, the OECD data take advantage of using PPP as a conversion factor. The OECD data were specifically developed by the OECD and the Statistical Office of the European Communities (Eurostat) for OECD member countries. Besides the better quality of the OECD data, the survey of the OECD data runs more frequently than the ICP data, providing the most updated data to the researchers.

Our research provides not only estimates of demand elasticities for aggregated goods but also estimates of demand elasticities for disaggregated food items. By doing so, we employ a two-stage budgeting concept such that the allocation problem is divided into two stages. The first stage is concerned with the allocation of total expenditure among aggregated or broad consumption categories, whereas the second stage focuses on the allocation of group expenditure among items within that group. In our study, the second stage covers the allocation of food expenditure to eight food items: cereals and bread, meat and fish, dairy, fats and oil, fruit and vegetables, other foods, beverages and tobacco, and food away from home.

The estimations of demand elasticities will be based on the new demand model developed by Theil et al. (1989). In their study, the discussion generally focused on broad consumption categories and the use of a new demand model with preference independence assumption (Florida PI model). Unlike the work by Theil et al. (1989), the implementation of the Florida Slutsky model will be fully elaborated in our research. The application of the Florida Slutsky model will be addressed in the analysis of the food subgroups where the preference independence assumption is relaxed. Moreover, our research will specifically investigate changing consumption patterns in the OECD region over time. Systems of demand equations are estimated using a mathematical and statistical package, GAUSS. Expected results include the estimated parameters, income elasticities, and own-price elasticities for each time period and for pooled data.

Objectives

The objectives of our research are as follows:

1. To study the historical background and the importance of applying PPP-converted data in international comparison analysis.
2. To study the theoretical background of the separability of demand and the conceptual framework of the Florida PI model and the Florida Slutsky model.
3. To perform parameter estimation for aggregate goods as well as to extend the estimation to disaggregated food products using the OECD data.

4. To derive formulations used for pooling the data based on the OECD data and to report the pooled estimates.
5. To derive formulations for converting conditional demand elasticities to unconditional demand elasticities.
6. To interpret and discuss the estimated parameters and the structural changes of income and price in consumer expenditure.

Organization of the Research

Our research is divided into seven chapters. The format of the dissertation is as follows. Chapter 2 describes the background of the PPP-converted data as well as aggregation and disaggregation of consumption grouping. Chapter 3 presents the theoretical framework of the demand theory employed in the dissertation, including separability of preferences and the two-stage budgeting procedure. Estimation methods, parameter estimates, and the interpretation of the results obtained from the allocation of total income among broad consumption groups for each time period and for pooled data will be discussed in Chapters 4 and 5. Chapters 6 and 7 discuss the estimation method and analyze parameter estimates for the allocation of food expenditure to food subgroups and their corresponding conditional and unconditional demand elasticities for pooled data. Chapter 8 concludes the findings.

CHAPTER 2

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT CONSUMPTION DATA

The main objective of this chapter is to describe the data employed in this research. The chapter starts by presenting a brief history and the important role of PPPs in international comparison analyses. The discussion is followed by the background and history of the ICP data, which leads to an introduction of the OECD consumption data of the Eurostat-OECD PPP Programme. Details of the OECD consumption data for each benchmark study are also discussed, including the calculation and aggregation of the PPPs. The chapter concludes with the aggregation and disaggregation of the OECD consumption categories employed in the study.

Overview

With a growing demand for comparative analysis among countries, it is necessary for researchers to establish unbiased currency conversion rates for the purpose of international comparison. Often, exchange rates are used to convert national currencies of different countries to common currencies. However, this is a poor choice. As pointed out by Gilbert and Kravis (1954), the use of exchange rates is highly problematic for this purpose. In their study, they compared real expenditure, by categories of goods, for European countries (i.e., France, Germany, Italy, and the United Kingdom) to that for the United States in 1950. By using the official exchange rate in 1950, Gilbert and Kravis concluded that one dollar's worth of European currency was eligible to buy more goods in Europe than in the United States. This means that the exchange rate does not equate the differences in price levels of the countries. Instead, it magnifies the differences in the price levels and in the production volume. In addition, exchange rates are volatile and the exchange-rate-converted figures are not good indicators for the size of the economies.

The error caused by the use of exchange rates in conducting international comparison analyses leads to the introduction of PPPs. Basically, PPPs are defined as the conversion rates between two currencies, which would equate the purchasing power of different currencies by eliminating the differences in price levels between countries (OECD 2002a, p. 10). In practice, the PPPs are more suitable for international comparison analyses than are official exchange rates. For instance, a report on PPPs and real expenditures conducted by the OECD for the 1999 benchmark year (OECD, 2002a) indicated variations between the exchange rate-converted data and the PPP-converted data, which leads to a misrepresentation of the relative sizes of economies. The report presented the gross domestic products (GDPs) of the United States and Japan as a percentage of the GDPs of the 15 EU countries in 1985, 1990, 1993, 1996, and 1999 (Figures 2.1 and 2.2). Consider the 1993 data which showed that the exchange-rate-converted GDP of the United States was 7% smaller than that of the 15 EU countries, whereas the PPP-converted GDP of the United States was 2% larger than that of the 15 EU countries. Similarly, the 1993 exchange-rate-converted GDP of Japan indicated that Japan's was 38% smaller than that of the 15 EU countries, whereas the PPP-converted GDP of Japan indicated that Japan's was 59% smaller than that of the 15 EU countries. Similar evidences can be found in 1985, 1990, 1996, and 1999. This example suggests that the exchange-rate-converted GDPs often give misleading estimates compared to PPP-converted GDPs.

Background of the ICP

The ICP was developed at the end of the 1960s by Kravis et al. as a pilot study of the University of Pennsylvania and the United Nations Statistical Office. The objective of this project was to establish PPP statistics, the GDP, and its components that are comparable across nations. The funding was provided by the World Bank and many regional, national, and international organizations. For instance, Eurostat and EU countries financed the African comparisons. OECD financed regional comparisons in Europe. The Economic and Social Commission for Asia and the Pacific (ESCAP), Japan, and the Asian Development Bank financed the comparison in Asia. The Economic Commission for Latin America and the Caribbean (ECLAC), the Economic and Social Commission for Western Asia (ESCWA), and the Caribbean Community (CARICOM) supported the project in their respective regions with financial support from the ICP Trust Fund (United Nations, 2000). The ICP was carried out in many benchmark studies. Each benchmark provided estimates of GDPs and PPPs of the participating countries during the observation period. The GDPs consist of consumption expenditure, investment, and government expenditure. These main components can be disaggregated further into various detailed categories.

The ICP was developed based on the pioneer works from the Organisation for European Economic Cooperation (OEEC) during the 1950s, including the study by Gilbert and Kravis (1954) and Gilbert and associates (1958). The first phase (Phase I) of the ICP covered 10 countries with a 1970 reference year. The results of Phase I of the ICP were published in 1975 (Kravis et al., 1975). The second phase (Phase II) of the ICP covered 16 countries. Two types of estimates were presented in this phase. The first estimates included a revision of the 1970 reference year and new 1973 estimates for the

10 countries appearing in the first phase. The second estimates included both 1970 and 1973 estimates for six additional countries (Kravis et al., 1978). The third phase (Phase III) of the ICP covered 34 countries, basing the estimates on a 1975 reference year. The report was published in 1982 (Kravis et al., 1982). Regionalization was first introduced in the fourth phase (Phase IV), where countries were grouped into regions. The reference year for Phase IV of the ICP was 1980, covering a total of 60 countries. The next phases after the 1980 round were the 1985 round (Phase V) and a partial round in 1990, covering 64 countries and 30 countries, respectively. The most recent available ICP data were for the 1993/1996 round, with a total of 117 countries. Meanwhile, the forthcoming version of the ICP data (the 2003-2006 global round, or ICP 2004) will be available to the public in 2006. This global round will cover as many as 160 countries from six regions of the world (World Bank, 2004).

Eurostat-OECD Purchasing Power Parity Programme

The ICP was inspired by the OECD (former OEEC) works during the 1950s. The Eurostat initiated the PPP programme in the late 1960s to provide estimates for the members of the European Economic Community (EEC), which is now the EU. In spite of the involvements of the OECD and the Eurostat in the PPP programme, the initiation of the ICP during the 1960s shifted its center of operations to the University of Pennsylvania. In the early 1980s, the OECD reactivated its involvement in the PPP programme so as to provide estimates for non-European member countries of the OECD. With support from Eurostat, the Eurostat-OECD PPP Programme was established to provide internationally comparable price and volume measures of GDP and its components for member states of the EU and the member countries of the OECD (OECD, 2002a). Similar to the ICP data, the number of countries participating in the

Eurostat-OECD PPP Programme has continually increased over the years. Currently, there are six rounds of OECD data. Each round refers to different benchmark years. In addition, the GDPs provided by the Eurostat-OECD PPP Programme can be broken down into product groups or basic headings. The basic heading is a group of similar and well-defined goods or services for which a sample of products can be selected that is both representative of their type and of the purchases being made in the participating countries. It is the lowest level of expenditure category for which explicit weights can be calculated (OECD, 2002a). For instance, we can say that cheddar, feta, and gorgonzola are products under the basic heading "cheese". However, there is no restriction on how broad each basic heading should cover.

1980 Round

The 1980 round is the first round of the Eurostat-OECD PPP Programme. Eighteen countries were included in this round and the calculation of PPPs was based on price and expenditure data relating to the year 1980. All 18 countries were OECD member countries. At the time of the survey, only 12 countries were members of both the OECD and the EU (Ward, 1985). Table 2.1 provides a detailed list of the countries in the 1980 round. Because of the limitation of the data, the 1980 round will not be employed in our research.

1985 Round

The 1985 round is the second round. Table 2.2 presents 22 OECD member countries that were covered in this round. Out of the 22 countries, 12 countries were both EU and OECD members when the survey took place. The PPPs and the expenditures of this round were calculated based on price and expenditure data relating to the year 1985. The Eurostat collected the data and calculated the PPPs and real expenditures for the 12

EU member countries and Austria, while the OECD collected the data and calculated the results for the rest of the countries (OECD, 1987).

1990 Round

The 1990 round is the third round. Table 2.3 presents 24 OECD countries covered in this round. Of the 24 countries, 12 countries were members of both the EU and the OECD during the survey. The PPPs and real expenditures were derived using the price and expenditure data collected in the 1990 round. Eurostat and the OECD divided the responsibilities on data collection and the calculation of the PPPs and real expenditures. In this round, Eurostat was responsible for the 12 EU member countries, Austria, and Switzerland. The OECD was responsible for the remaining 10 countries. The overall results for the 24 countries were integrated by the OECD (OECD, 1993).

1993 Round

The 1993 round is the fourth round. The same 24 OECD member countries covered in the 1990 round were in this round (Table 2.3). However, the calculation of the PPPs and real expenditures was based on the price and expenditure data collected during the 1993 round. The division of responsibilities for the data collection and the calculation of the PPPs and real expenditures were similar to those in the 1990 round.

1996 Round

The 1996 round is the fifth round. Table 2.4 presents the 32 countries covered in this round. Fifteen countries were members of both the EU and the OECD at the time of the survey. Twenty-eight countries were OECD members. The 1996 round is the first round to include countries that were not members of either the EU or the OECD. The four non-member countries are Israel, the Russian Federation, the Slovak Republic, and Slovenia.

The calculation of the PPPs and real expenditures was based on the price and expenditure data collected during the 1996 round. Both the Eurostat and the OECD were responsible for the data collection and the calculation of the PPPs and real expenditures. The Eurostat provided the data for the 15 EU member countries, Iceland, Norway, Poland, and Switzerland. The results of the 13 remaining countries were provided by the OECD. Finally, the OECD combined both results together to obtain the overall results for the 32 countries (OECD, 2000).

1999 Round

The 1999 round is the most recent round. There were 43 countries in this round. Fifteen countries were members of both the EU and the OECD at the time of the survey. Thirty countries were OECD members. Thirteen countries were neither EU nor OECD members. Those 13 countries are Bulgaria, Croatia, Cyprus, Estonia, Israel, Latvia, Lithuania, Macedonia, Malta, Romania, the Russian Federation, Slovenia, and Ukraine. Table 2.5 provides details of the composition of country groups for the 1999 round. The PPPs and expenditures were calculated using price and expenditure data collected during the 1999 round of the Eurostat-OECD PPP Programme. The Eurostat was responsible for the data collection and the calculation of the PPPs and real expenditures of 31 countries, consisting of 15 EU member countries, three member countries of the European Free Trade (Iceland, Norway, and Switzerland), and 13 countries of the EU-candidate countries (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovenia, the Slovak Republic, and Turkey). Similarly, the OECD was responsible for the data collection and the calculation of the PPPs and the real expenditures of seven non-European countries (Australia, Canada, Japan, Korea, Mexico, New Zealand, and the United States) and five other countries (Croatia, Israel, Macedonia, the Russian Federation, and Ukraine). Finally, the OECD incorporated its results with those obtained from the Eurostat in order to acquire the final results of 43 countries (OECD, 2002a).

Calculation and Aggregation of PPPs

The calculation of PPPs for the Eurostat-OECD PPP programme is divided into two main steps:

- The first step involves an estimation of unweighted PPPs at the basic heading level. This step includes a derivation of the price relatives for individual goods and services, and a calculation of the unweighted parities at the basic heading level, which is completed by averaging the price relatives obtained earlier.
- The second step is the aggregation of the basic heading PPPs up to the GDP level. In this step, the basic heading parities are combined using the breakdowns of national expenditures as weights to arrive at weighted parities of PPPs for each level of aggregation up to the level of GDP.

For the first step, two methods of estimating the unweighted PPPs at the basic heading level are available. Either the Elteto-Koves-Szulc (EKS) method or the Country-Product-Dummy (CPD) method can be employed. The choice is arbitrary as to which method should be selected. Although neither of the two methods is theoretically proven to be better, the EKS method was chosen for the Eurostat-OECD PPP Programme. For the aggregation of PPPs, either the EKS method or the Geary-Khamis (GK) method can be employed. The GK method was used prior to the 1990 round. The results of the 1990 round and later rounds were calculated using either the EKS method or the GK method. However, our research focuses on the use of the results that were calculated using the GK aggregation method. The justification of selecting the GK aggregation method will be explained in the next section.

Estimation of Unweighted PPPs at the Basic Heading Level

The Eurostat-OECD PPP Programme selected the EKS method for the estimation of unweighted PPPs at the basic heading level. OECD (2002a) provides the steps applied by the EKS method for an estimation of unweighted PPPs as follows:

- A PPP between each pair of countries is derived from a geometric mean of the price relatives for products representative of the first country and the geometric mean of the price relatives of the second country. This gives a matrix of binary PPPs for each basic heading, which is intransitive (i.e., the ratio of the PPP between countries A and B and the PPP between countries B and C is not equal to the PPP between countries A and C).
- In the case of missing PPPs, the geometric mean of all the available indirect PPPs bridging the pairs of countries for which direct PPPs were missing were applied instead.
- The matrix of binary PPPs was made transitive by applying the EKS method. This can be done by replacing the direct PPPs between each pair of countries by the geometric mean of itself squared and all the corresponding indirect PPPs between the pair obtained using the other countries as a bridge.

Aggregation of the GDP Level

As mentioned earlier, two methods exist for aggregating from the basic heading level up to the GDP level. Both methods have been employed by the Eurostat-OECD PPP Programme.

EKS method

The EKS method treats countries as a set of independent units with an equal weight for each country. The aggregation steps for the EKS method are as follows:

- The process starts by calculating two weighted PPPs for each pair of countries. By weighting the basic heading PPPs using the expenditures on the basic headings of the first country and the second country as weights, respectively, the weighted basic heading PPPs were summed and averaged.
- By replacing the Fisher PPPs by the geometric mean of itself squared and all the indirect Fisher PPPs obtained using each of the other countries as a bridge, the matrix becomes transitive.

- The real expenditures in a common currency were obtained by converting the national expenditures in national currencies by the EKS PPPs.

A major drawback is that the real expenditures obtained from the EKS method are not additive (i.e., the real values of GDPs components do not add up to the real values of total GDPs). As a result, the EKS method is not suitable for the cross-country demand study.

GK method

Unlike the EKS method, the GK method is suitable for studies where cross-country comparisons are necessary. This is because of its additive property (i.e., the real values of aggregates are the sum of the real values of their components). Because the GK method treats each country as part of a country grouping, changes in the composition of the countries would have an effect on the results. In fact, this logic leads to two major drawbacks of the GK method. The first drawback is due to the Gerschenkron effect, which states that countries whose price structures are different from the structure of the average prices used in the aggregation process will be shown as having higher relative volume levels than they would have if average prices that are more characteristic of their own prices had been used (OECD 2002a, p. 165). The second drawback is that average prices and the relationships between countries vary with the composition of the countries. The aggregation steps for the GK method are as follows (OECD 2002a, pp. 166-167):

- The matrix of basic heading PPPs was divided into the matrix of basic heading expenditure to obtain a matrix of quantities. This matrix, when summed across countries by basic heading, gave a vector of quantities. Then, using the unweighted averages of the basic heading PPPs as an initial set of overall PPPs, the expenditure matrix was converted to a matrix of real expenditures from which a vector of real expenditures was obtained. This vector, when divided by the quantity vector, provided a vector of average prices.
- The quantity matrix was multiplied by the average price vector to obtain a second matrix of real expenditures. The country totals of this matrix when divided into the country totals of the expenditure matrix provided a second set of overall PPPs. These were used to convert the expenditure matrix to a third matrix of real

expenditures. This in turn provided a new vector of real expenditures, which when divided by the quantity vector gave a second vector of average prices.

- Repetition of the calculation from the previous steps provided further sets of overall PPPs, real expenditures, and average price. After the cycle was repeated several times, the results converged and the final sets of average prices, real expenditures, and overall PPPs emerged.

Fixity

The fixity convention was established during the 1980 round. Basically, the fixity convention ensures that the ranking of the EU member countries, in terms of GDPs, remain unchanged as the composition of the group of countries being compared changes. While the expenditures calculated from the EKS method follow the rules created by the fixity convention, the expenditures from the GK method do not.

Consumption Classification

Because the Eurostat-OECD PPP Programme expenditure data were broken down into basic headings, consumption groups can be easily formed by combining those basic headings up to the main consumption categories, provided that the aggregation method was the GK method. In our study, nine broad consumption categories of goods and eight food subcategories are analyzed.

Aggregate the Consumption Categories

The food, beverages, and tobacco category is the first group of the broad consumption categories. This category consists of three main food groups. The first group is food consumption at home, which includes cereals and bread, dairy, meat and fish, fats and oil, fruits and vegetables, and other foods. The second group is the consumption of beverages and tobacco, which includes both alcoholic and non alcoholic beverages and all tobacco products. The third group is food consumption away from home, which consists of food and beverages that were previously included in the medical care category as well as food consumed in canteens, restaurants, and any other places that were previously included in the other expenditures category.

The clothing and footwear category is the second group of the nine broad consumption categories. This group covers all kinds of clothing and footwear. It also includes expenditures on materials, yarns, and accessories as well as repairs and maintenance of clothing and footwear. The third broad grouping is the gross rent, fuel, and power category. This category includes rents (tenants and owner-occupiers); repairs and maintenance of housing, sanitary services, and water charges, and expenditures on household fuel consumption (electricity; town gas, natural gas, and liquefied petroleum gas; liquid fuels for heating and lighting; and coal, coke, and other solid fuels).

The fourth group of the broad consumption category is the house furnishings and operations category. This category covers furniture and fixtures (including repairs); carpets and other floor coverings (including repairs); household textiles and other furnishings (including repairs); expenditures on household appliances (such as refrigerators and freezers, washing machines, dryers, dishwashers, cookers, ovens, heaters, air-conditioners, vacuum cleaners and polishers, glassware and tableware, cutlery and silverware, kitchen utensils, garden appliances, electric bulbs, wires, plugs, etc.); expenditures on repairs and maintenance of household appliances; expenditures on cleaning and maintenance products; and expenditures on other non-durable household goods, household services, and domestic services.

The fifth group of the broad consumption category is the medical care category. Medical care includes items such as drugs and medical preparations, medical supplies, spectacle lenses and contact lenses, orthopedic and therapeutic appliances; services of general practitioners, specialists, dentists, nurses, and other practitioners; and expenditures on medical analyses, medical and non medical staffs, pharmaceutical products, therapeutical equipment, other equipments, maintenance, and other services. Reported prices for medical goods and services were market prices when products were unsubsidized or total prices without subsidies.

The sixth group of the broad consumption category is transport and communications. The transport and communication category covers all transportation and communication expenses, including maintenance expenses. Examples of expenditures in this category are passenger vehicles with diesel engines; motorcycles and bicycles; tires; tubes; parts; accessories; maintenance and repair services; motor fuels, oils, and greases; car hire; driving schools; tolls; car insurance; local transportation (by bus, train, tube, tram, and taxi); long distance transportation (by coach, rail, air, and sea); other purchased transport services; postal services; and telephone, telegraph, and telex services.

The seventh group of the broad consumption category is recreation. The recreation category includes expenses on leisure and entertainment activities such as radios, televisions, video recorders, record players, cassette recorders, cameras and photographic equipment, office machines and equipment, records, tapes, cassettes, sports goods and camping equipment, games, toys, hobbies, films and photographic supplies, flowers, plants, shrubs, pets and related products, parts and repairs for recreational goods, cinemas, stadiums, museums, zoos, sporting and recreational activities, lotteries and gambling, radio and television license and rental, photographic services, veterinary services, books, newspapers, and other printed matters.

The eighth group of the broad consumption category is education. The education category includes educational fees and compensation to instructors and employees. The ninth and final group of the broad consumption category is other expenditures. This category features miscellaneous expenditures such as hairdressers, beauty parlors, durable and non durable toilet articles, and repairs, jewelry, watches and repairs, travel goods and baggage items, goods for babies, personal accessories, writing and drawing equipment and supplies, insurance charges (except for car and health insurances), fees for other services, and other lodging places.

Food Subgroups

The food, beverages, and tobacco category can be further disaggregated into eight food subgroups as follows:

- Cereals and bread include rice, flour, bread and other bakery products, pasta products, and cereal products.
- Meat and fish include fresh beef, veal, pork, lamb, mutton, goat, poultry, and other meat; frozen and chilled beef, veal, pork, lamb, mutton, goat, poultry, and other meat; delicatessen and other meat preparations and extracts; fresh fish and seafood; frozen or deep-frozen fish and seafood; preserved or processed fish and seafood; and dried, smoked or salted fish.
- Dairy includes fresh milk, pasteurized milk, sterilized milk, condensed milk, evaporated milk, powdered milk, other milk products (excluding cheese), processed and unprocessed cheese, and eggs and egg products.
- Fats and oil include butter, margarine, edible oils, and other animal and vegetable fats.
- Fruit and vegetables include fresh fruit, dried fruit and nuts, frozen and preserved fruit and juices, fresh vegetables, dried vegetables, frozen vegetables, preserved vegetables, juices, soups, potatoes and other tuber vegetables, and potato products.
- Other foods include raw and refined sugars, coffee and instant coffee, tea and other infusions, cocoa (excluding cocoa preparations), jams, jellies, honey and syrups, chocolate and cocoa preparations, confectioneries, edible ice and ice-cream, salt, spices, sauces, and condiments.

- Beverages and tobacco include mineral water, other soft drinks, spirits and liqueurs, wine (not fortified or sparkling), beer, other wines and alcoholic beverages, cigarettes, and other tobacco products.
- Food consumed away from home includes food and beverages consumed in medical and healthcare facilities, restaurants and take-aways, pubs, cafes, bars, tea rooms, and staff canteens.

Analysis of Aggregate Category Budget Shares

The averages of allocations of total expenditure among nine broad consumption groups during 1985-1999 are presented in Figure 2.3. The diagram indicates an increase in food expenditure share since 1993, after a steady decline in the food, beverages, and tobacco budget spent between 1985 and 1993. The expenditure shares of food, beverages, and tobacco are between 25% and 29% of total income. On average, consumers spent the largest percentage share of their total income on food, beverages, and tobacco. The next largest budget share is for gross rent, fuel, and power, followed by transport and communications. Since 1985, consumers have slightly increased budgets spent on gross rent, fuel, and power (about 17% to 19% of total income). The smallest budget share category is medical care.

Table 2.6 shows average budget shares of demand for broad consumption groups for the years 1985, 1990, 1993, 1996, and 1999, respectively. Based on country real income per capita with respect to that of the United States, we divide countries into two distinct groups (the higher income group and the lower income group). The higher income group consists of countries with real income per capita with respect to that of the United States greater than 0.50, while the lower income group consists of the countries not included in the higher income group. The findings suggest that consumers in the higher income group spend much less of their total income on the food, beverages, and tobacco category than do consumers in the lower income group in every year. However, consumers in the higher income group spend less of their total income on the clothing and footwear category than do consumers in the lower income group between 1985 and 1996. In contrast, consumers in the higher income group spend more of their total income on gross rent, fuel, and power; medical care; transport and communications; recreation; and other expenditures than do consumers in the lower income group in every year. The allocation of total income to house furnishings and operations was approximately the same for both groups during the 1985-1993 period, but the shares were larger for consumers in the higher income group in 1996 and 1999.

Analysis of Food Subgroup Budget Shares

The averages of the food expenditure shares for eight food subgroups during 1985-1999 are shown in Figure 2.4. Given food expenditure, the diagram indicates that consumers allocate most of their food expenditures to demand for food away from home, followed by the beverages and tobacco and the meat and fish subgroups. The expenditure shares on food away from home increased from 22% of total food expenditures in 1985 to 24% of total food expenditures in 1990 and to 25% of total food expenditures in 1993. The food expenditure shares on food away from home have decreased since 1993. In the case of demand for beverages and tobacco, its conditional share increased from 18% in 1985 to 21% in 1999. In contrast, the food expenditure shares of the demand for meat and fish decreased from 20% in 1985 to 17% in 1999.

Given food expenditure, demands for dairy, fruit and vegetables, and other foods have maintained a stable expenditure share over time, while demand for cereals and bread has increased its percentage share since 1985. In fact, the food expenditure share of demand for cereals and bread slightly increased from 8% in 1985 to 10% in 1999. In addition, average conditional budget shares further suggest that consumers allocate the least of their food expenditures to demand for fats and oil. Overall, the analysis of food budget shares suggests that OECD consumers are shifting more towards the consumption of cereals and bread, beverages and tobacco, and food away from home.

Table 2.7 shows average conditional budget shares of the demand for eight food subgroups, given food expenditure, for the years 1985, 1990, 1993, 1996, and 1999, respectively. As before, countries were divided into higher income and lower income groups. The higher income group consists of countries with real income per capita with respect to that of the United States greater than 0.50, while the lower income group consists of the countries not included in the higher income group. Our findings show that consumers in the lower income group allocate a larger proportion of their food expenditure towards demand for meat and fish, fats and oil, and fruit and vegetables in every year. In addition, consumers in the lower income group allocated a larger proportion of their food expenditure towards demand for cereals and bread (1985, 1996, and 1999) and demand for other foods (1996 and 1999) than did consumers in the higher income group. Consumers in both groups allocated the same proportion of their food expenditure towards demand for dairy in 1985 and 1990. However, since 1993, consumers in the lower income groups have allocated a larger proportion for dairy than have consumers in the higher income group. On the other hand, consumers in the higher income group spent a larger proportion of their food expenditure on demand for beverages and tobacco (1985, 1990, 1996, and 1999) and food away from home (1985, 1996, and 1999) than did consumers in the lower income group.

Table 2.1. List of participating countries in the 1980 round of the OECD data

OECD Countries		Non-OECD Countries
EU Countries	Non-EU Countries	
Belgium	Austria	—
Denmark	Canada	
France	Finland	
Germany	Japan	
Greece	Norway	
Ireland	United States	
Italy		
Luxembourg		
Netherlands		
Portugal		
Spain		
United Kingdom		

Source: Purchasing power parities and real expenditures in the OECD (Ward, 1985)

Table 2.2. List of participating countries in the 1985 round of the OECD data

OECD Countries		Non-OECD Countries
EU Countries	Non-EU Countries	
Belgium	Australia	—
Denmark	Austria	
France	Canada	
Germany	Finland	
Greece	Japan	
Ireland	New Zealand	
Italy	Norway	
Luxembourg	Sweden	
Netherlands	Turkey	
Portugal	United States	
Spain		
United Kingdom		

Source: Purchasing power parities and real expenditures (OECD, 1987)

Table 2.3. List of participating countries in the 1990 and 1993 rounds of the OECD data

OECD Countries		Non-OECD Countries
EU Countries	Non-EU Countries	
Belgium	Australia	—
Denmark	Austria	
France	Canada	
Germany	Finland	
Greece	Iceland	
Ireland	Japan	
Italy	New Zealand	
Luxembourg	Norway	
Netherlands	Sweden	
Portugal	Switzerland	
Spain	Turkey	
United Kingdom	United States	

Source: Purchasing power parities and real expenditures: GK results (OECD, 1993)

Table 2.4. List of participating countries in the 1996 round of the OECD data

OECD Countries		Non-OECD Countries
EU Countries	Non-EU Countries	
Austria	Australia	Israel
Belgium	Canada	Russian Federation
Denmark	Czech Republic	Slovak Republic
Finland	Hungary	Slovenia
France	Iceland	
Germany	Japan	
Greece	Mexico	
Ireland	New Zealand	
Italy	Norway	
Luxembourg	Poland	
Netherlands	Switzerland	
Portugal	Turkey	
Spain	United States	
Sweden		
United Kingdom		

Source: Purchasing power parities and real expenditures: 1996 results (OECD, 2000)

Table 2.5. List of participating countries in the 1999 round of the OECD data

OECD Countries		Non-OECD Countries
EU Countries	Non-EU Countries	
Austria	Australia	Bulgaria
Belgium	Canada	Croatia
Denmark	Czech Republic	Cyprus
Finland	Hungary	Estonia
France	Iceland	Israel
Germany	Japan	Latvia
Greece	Korea	Lithuania
Ireland	Mexico	Macedonia
Italy	New Zealand	Malta
Luxembourg	Norway	Romania
Netherlands	Poland	Russian Federation
Portugal	Slovak Republic	Slovenia
Spain	Switzerland	Ukraine
Sweden	Turkey	
United Kingdom	United States	

Source: Purchasing power parities and real expenditures: 1999 benchmark year (OECD, 2002a)

Table 2.6. Average budget shares for broad consumption groups from 1985 to 1999, by country group

Year	Country group	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
1985	Higher income group	26%	7%	19%	7%	6%	14%	7%	9%	7%
	Lower income group	43%	8%	12%	7%	3%	13%	4%	6%	5%
1990	Higher income group	26%	7%	19%	7%	7%	15%	8%	9%	5%
	Lower income group	41%	8%	11%	7%	3%	13%	6%	6%	4%
1993	Higher income group	24%	6%	19%	7%	7%	14%	7%	8%	8%
	Lower income group	37%	7%	12%	7%	4%	13%	6%	6%	7%
1996	Higher income group	23%	6%	19%	7%	7%	14%	8%	9%	8%
	Lower income group	35%	7%	16%	6%	3%	12%	6%	8%	7%
1999	Higher income group	24%	6%	20%	7%	4%	15%	9%	7%	8%
	Lower income group	35%	6%	18%	5%	3%	14%	6%	7%	5%

Note: Percentage shares are rounded to the nearest integer values. The higher income group consists of countries with real income per capita with respect to that of the United States greater than 0.50, while the lower income group consists of the countries not included in the higher income group (Sources: OECD 1987, 1993, 2000, 2002a).

Table 2.7. Average conditional budget shares for food subgroups from 1985 to 1999, by country group

Year	Country group	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
1985	Higher income group	8%	19%	8%	3%	10%	9%	19%	23%
	Lower income group	10%	24%	8%	5%	14%	5%	17%	17%
1990	Higher income group	9%	18%	9%	2%	10%	9%	19%	24%
	Lower income group	7%	24%	9%	3%	13%	6%	15%	24%
1993	Higher income group	9%	18%	8%	2%	10%	8%	19%	25%
	Lower income group	6%	19%	10%	3%	13%	7%	19%	25%
1996	Higher income group	9%	16%	8%	2%	10%	8%	20%	26%
	Lower income group	10%	19%	10%	3%	12%	10%	19%	16%
1999	Higher income group	9%	15%	7%	2%	9%	9%	22%	27%
	Lower income group	11%	20%	10%	3%	13%	10%	20%	13%

Note: Percentage shares are rounded to the nearest integer values. The higher income group consists of countries with real income per capita with respect to that of the United States greater than 0.50, while the lower income group consists of the countries not included in the higher income group (Sources: OECD 1987, 1993, 2000, 2002a).

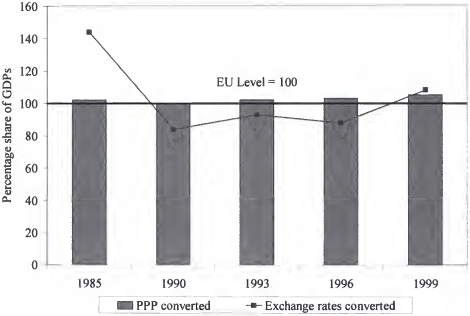

Figure 2.1. Comparison between the exchange rate-converted GDPs and the PPP-converted GDPs of the United States as a percentage of the GDP of the 15 EU countries from 1985 to 1999 (Source: Purchasing power parities and real expenditures, 1999 benchmark year, OECD 2002a)

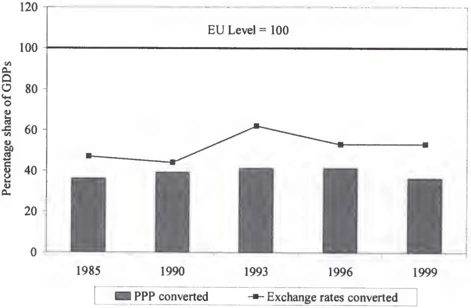

Figure 2.2. Comparison between the exchange rate-converted GDPs and the PPP-converted GDPs of Japan as a percentage of the GDP of the 15 EU countries from 1985 to 1999 (Source: Purchasing power parities and real expenditures, 1999 benchmark year, OECD 2002a)

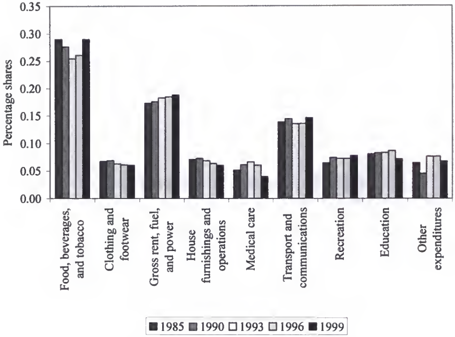

Figure 2.3. Average total expenditure shares during 1985-1999 (Sources: OECD 1987, 1993, 2000, 2002a)

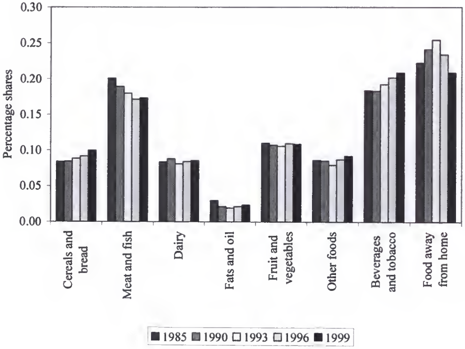

Figure 2.4. Average food expenditure shares during 1985-1999 (Sources: OECD 1987, 1993, 2000, 2002a)

CHAPTER 3
THEORETICAL OVERVIEW AND METHODOLOGY

This chapter presents a theoretical overview of consumer demand theory, including demand separability. The discussion also includes the two demand systems (Florida PI and Florida Slutsky models) applied throughout the research. Their properties and a brief discussion of methods of estimation will be reviewed. Finally, this chapter will present and discuss the definitions of information inaccuracy and Strobel measures that are employed to identify potential outlying countries in the model.

Consumer Demand Theory

In the context of consumer demand, consumers make an optimum choice based on their limited resources. Consumer preferences are represented by the utility function. Therefore, consumers try to maximize their utility function, given the budget constraint. Following Barten (1977), consider a utility maximization problem,

$$\begin{aligned} &\underset{q}{Max} \quad u(q_1,\ldots,q_n) \\ &\text{subject to} \qquad \sum_{i=1}^{n} p_i q_i = E, \end{aligned} \tag{3.1}$$

where $u(q_1,\ldots,q_n)$ is a strictly quasi-concave monotone increasing utility function, q_i and p_i are quantity and unit price of good i for $i = 1,\ldots, n$, respectively. The term E is total expenditure. The Lagrangian function expression can be written as

$$\zeta = u(q_1,\ldots,q_n) - \mu(\sum_{i=1}^{n} p_i q_i - E), \tag{3.2}$$

where μ is the Lagrange multiplier. The next step is to set up the first-order conditions of the maximization problem. This can be done by taking the first-order derivatives of the Lagrangian function with respect to q and μ and setting them equal to zero. The first-order conditions of the problem are

$$\frac{\partial \zeta}{\partial \mu} = \sum_{i=1}^{n} p_i q_i - E = 0 \qquad \text{or} \qquad \sum_{i=1}^{n} p_i q_i = E \quad \text{and} \tag{3.3}$$

$$\frac{\partial \zeta}{\partial q_i} = \frac{\partial u}{\partial q_i} - \mu p_i = 0 \qquad \text{or} \qquad \frac{\partial u}{\partial q_i} = \mu p_i \,. \tag{3.4}$$

The result of the first-order derivative of the Lagrangian function with respect to μ is simply the budget constraint. The term μ can also be viewed as the marginal utility of income. It is clear from Equation 3.4 that the marginal utility of income is not constant. In fact, it is a function of quantity and prices. Given the first-order conditions, the responsiveness of the quantity demanded for a change in total expenditure and prices can be found by taking the derivatives of the first-order conditions with respect to both total expenditure and prices. The result can be written in a matrix form as

$$\begin{bmatrix} U & p \\ p^T & 0 \end{bmatrix} \begin{bmatrix} q_E & Q_p \\ -\mu_E & -\mu_p^T \end{bmatrix} = \begin{bmatrix} 0 & \mu I \\ 1 & -q^T \end{bmatrix}, \tag{3.5}$$

where $U = [\partial^2 u / \partial q_i \partial q_j]$, $q_E = [\partial q_i / \partial E]$, $Q_p = [\partial q_i / \partial p_j]$, $\mu_E = \partial \mu / \partial E$, and $\mu_p = [\partial \mu / \partial p_j]$. The solutions to Equation 3.5 can be solved by considering the inverse of the bordered Hessian of the first matrix on the left of Equation 3.5,

$$\begin{bmatrix} U & p \\ p^T & 0 \end{bmatrix}^{-1} = \frac{1}{p^T U^{-1} p} \begin{bmatrix} \left(p^T U^{-1} p\right) U^{-1} - \left(U^{-1} p\right)\left(U^{-1} p\right)^T & U^{-1} p \\ \left(U^{-1} p\right)^T & -1 \end{bmatrix}. \tag{3.6}$$

Premultiplying both sides of Equation 3.5 by the inverse of the bordered Hessian (Equation 3.6) gives

$$\begin{bmatrix} q_E & Q_p \\ -\mu_E & -\mu_p^T \end{bmatrix} = \frac{1}{p^T U^{-1} p} \begin{bmatrix} \left(p^T U^{-1} p\right) U^{-1} - \left(U^{-1} p\right)\left(U^{-1} p\right)^T & U^{-1} p \\ \left(U^{-1} p\right)^T & -1 \end{bmatrix} \begin{bmatrix} 0 & \mu I \\ 1 & -q^T \end{bmatrix}. \tag{3.7}$$

Using a matrix multiplication, the results can be written as

$$q_E = \frac{1}{p^T U^{-1} p} U^{-1} p, \tag{3.8}$$

$$Q_p = \mu U^{-1} - \frac{\mu}{p^T U^{-1} p}\left(U^{-1} p\right)\left(U^{-1} p\right)^T - \frac{1}{p^T U^{-1} p} U^{-1} p q^T, \tag{3.9}$$

$$\mu_E = \frac{1}{p^T U^{-1} p}, \text{ and} \tag{3.10}$$

$$\mu_p = -\frac{\mu}{p^T U^{-1} p} U^{-1} p - \frac{1}{p^T U^{-1} p} q. \tag{3.11}$$

where U^1 is the inverse of the Hessian matrix of the utility function and ϕ is the income flexibility or the reciprocal of the income elasticity of the marginal utility of income. In other words,

$$\phi = \frac{1}{d(\log \mu)/d(\log E)}. \tag{3.12}$$

Income flexibility is always negative because of the inverse relationship between income and marginal utility of income. Equation 3.9 shows that a change in the quantity demanded for good *i* due to a change in price of good *j* is the sum of a specific substitution effect, a general substitution effect, and an income effect of the price change on demand, respectively. The general substitution effect is concerned with the competition of all commodities for an additional dollar of income, whereas the specific substitution effect is concerned with the interaction between good *i* and good *j*.

Consider the quantity of good *i*, where $q_i = q_i(p_1,\dots,p_n,E)$, the total differentiation of q_i with respect to price variations and total expenditure yields

$$dq_i = \frac{\partial q_i}{\partial E} dE + \sum_{j=1}^{n} \frac{\partial q_i}{\partial p_j} dp_j \,. \tag{3.13}$$

Define the budget share of good *i* as $w_i = p_i q_i / E = E_i / E$, where p_i is the price of good *i* and q_i is the quantity of good *i*. Equation 3.13 can be transformed to

$$w_i d(\log q_i) = \frac{\partial (p_i q_i)}{\partial E} d(\log E) + \sum_{j=1}^{n} \frac{p_i p_j}{E} \frac{\partial q_i}{\partial p_j} d(\log p_j) \,. \tag{3.14}$$

From Equation 3.14, a derivative of E_i with respect to E gives the marginal share of good i (θ_i). This means that the coefficient of $d(\log E)$ is the marginal share of good *i*. By substituting Q_p from Equation 3.9 for $\partial q_i / \partial p_j$, Equation 3.14 can be rewritten as

$$w_i d(\log q_i) = \theta_i d(\log E) + \sum_{j=1}^{n} \frac{p_i p_j}{E} \left[\mu u^{ij} - \phi E \frac{\partial q_i}{\partial E} \frac{\partial q_j}{\partial E} - \frac{\partial q_i}{\partial E} q_j \right] d(\log p_j), \tag{3.15}$$

where u^{ij} is the (i, j) component of the inverse of the Hessian of the utility function (U^{-1}). Factoring in the term $p_i p_j / E$ gives

$$w_i d(\log q_i) = \theta_i d(\log E) + \sum_{j=1}^{n} \left[\frac{\mu p_i u^{ij} p_j}{E} - \phi \frac{\partial p_i q_i}{\partial E} \frac{\partial p_j q_j}{\partial E} - \frac{\partial p_i q_i}{\partial E} \frac{p_j q_j}{E} \right] d(\log p_j) \,. \tag{3.16}$$

By using the definition of the budget share and the marginal share, Equation 3.16 can be transformed to

$$w_i d(\log q_i) = \theta_i d(\log E) + \sum_{j=1}^{n} \left[\phi \theta_{ij} - \phi \theta_i \theta_j - \theta_i w_j \right] d(\log p_j), \tag{3.17}$$

where $\theta_{ij} = \dfrac{\mu p_i u^{ij} p_j}{\phi E}$ and it is symmetric positive definite. Note also that

$$\sum_{j=1}^{n} \theta_{ij} = \theta_i \qquad \text{and} \qquad \sum_{i=1}^{n}\sum_{j=1}^{n} \theta_{ij} = \sum_{i=1}^{n} \theta_i = 1. \tag{3.18}$$

Rearranging Equation 3.17 gives

$$w_i d(\log q_i) = \theta_i \left[d(\log E) - \sum_{j=1}^{n} w_j d(\log p_j) \right] + \phi \sum_{j=1}^{n} \theta_{ij} d(\log p_j)$$
$$- \phi \theta_i \sum_{j=1}^{n} \theta_j d(\log p_j) \tag{3.19}$$

This is the general form of the differential demand system for good *i* = 1,…, *n*.

Properties of Demands

Besides the assumption that the demand system is differentiable with respect to income and price, it is necessary that the demand system satisfies four additional conditions. The four conditions are the adding-up condition, the homogeneity condition, the symmetry condition, and the negativity condition.

- The adding-up condition states that the total value of the demands equals total expenditure. This follows directly from the budget constraint of the utility maximization problem.
- The homogeneity condition states that an increase of income and price in equal proportion leaves demand unchanged.
- The symmetry condition states that the cross-price derivatives of demands are symmetric.
- The negativity condition states that the *n* by *n* matrix of the cross-price derivatives of demands is negative semi definite, where *n* is the number of goods.

Multi-Stage Budgeting

Given the budget constraint, consumers allocate their income through a multi-stage budgeting procedure. Our study will focus on the two-stage budgeting process. In the first stage, consumers allocate total expenditure among broad consumption groups. In the second stage, group expenditures are allocated among individual commodities within the group. Following Goldman and Uzawa (1964), the utility function *u(q)* is strongly separable with respect to the partition $\{N_1,\ldots, N_S\}$ if the marginal rate of substitution between two commodities *i* and *j* from different groups N_s and N_t, respectively, does not depend on the quantities of commodities outside both groups (N_s and N_t). In contrast, the utility function *u(q)* is weakly separable with respect to the partition $\{N_1,\ldots, N_S\}$ if the marginal rate of substitution between two commodities *i* and *j* from the same group, N_s, does not depend on the quantities of commodities outside the group.

Strong Separability

Let $\{N_1,\ldots, N_S\}$ be a partition of $N = \{1,\ldots, n\}$ with $S > 2$. A utility function *u(q)* is strongly separable with respect to partition $\{N_1,\ldots, N_S\}$ if, and only if, $u(q) = u(q_1,\ldots, q_S)$ is written as follows:

$$u = F[u_1(q_1) + u_2(q_2) + \ldots + u_S(q_S)]. \tag{3.20}$$

F(t) is a monotonic-increasing function of one variable *t*. For each $s = 1,\ldots, S$, $u_S(q_S)$ is a function of subvector q_S. Recall that, for strong separability, the marginal rate of substitution between two commodities from two different groups does not depend on the value of quantities outside these two groups. This means that, for instance, the demand for group *S* does not affect the marginal rate of substitution between the demand for group 1 and the demand for group 2. That is, it can be shown that

$$\frac{\partial\left(\dfrac{\partial u/\partial q_a}{\partial u/\partial q_b}\right)}{\partial q_S} = 0, \tag{3.21}$$

where $q_a \in N_1$, $q_b \in N_2$, and $q_S \notin (N_1 \cup N_2)$.

Weak Separability

A utility function $u(q)$ is weakly separable with respect to partition $\{N_1,\ldots, N_S\}$ if, and only if, $u(q) = u(q_1,\ldots, q_S)$ is written as follows:

$$u = F[u_1(q_1),\ldots,u_S(q_S)]. \tag{3.22}$$

$F(u_1,\ldots, u_S)$ is a function of S variables. For each s, $u_S(q_S)$ is a function of subvector q_S alone. In cases of weak separability, the marginal rate of substitution between two commodities from the same group does not depend on the value of quantities outside that group. This means that, for instance, the demand for group S does not affect the marginal rate of substitution between two commodities within group 1. That is, it can be shown that

$$\frac{\partial\left(\frac{\partial u/\partial q_a}{\partial u/\partial q_{a'}}\right)}{\partial q_S} = 0, \tag{3.23}$$

where $q_a, q_{a'} \in N_1$, and $q_S \notin N_1$.

Theoretical Models

The analysis in our research will rely mainly on two demand models (Florida Slutsky and Florida PI models). Both models are extensions of Working's model (Working, 1943).

Working's Model

Working (1943) developed a demand model by analyzing data on U.S. household expenditures in the mid-1930s. He drew a relationship between the budget share of expenditure and total expenditure. For n goods, Working's model can be expressed as

$$w_i = \alpha_i + \beta_i \log E + \varepsilon_i \qquad i = 1,\ldots,n, \tag{3.24}$$

where w_i is the budget share of good *i*, *E* is total consumption expenditure, and ε_i is a residual term. The model also satisfies the additivity constraints,

$$\sum_{i=1}^{n} \alpha_i = 1, \text{ and} \tag{3.25}$$

$$\sum_{i=1}^{n} \beta_i = 0. \tag{3.26}$$

It is noted that the budget share of good *i* can also be defined as $w_i = p_i q_i / E = E_i / E$, where p_i is the price of good *i* and q_i is the quantity of good *i*. Substituting $w_i = E_i / E$ into Equation 3.24 and differentiating E_i with respect to *E* gives the marginal share of good *i* (θ_i), which can be written as

$$\theta_i = \frac{dE_i}{dE} = w_i + \beta_i. \tag{3.27}$$

The marginal share of good *i* measures changes in the expenditure of good *i* when total expenditure increases by one dollar, given that prices $(p_1, \ldots, p_n)$ are constant.

The income elasticity is simply the product of (dE_i / dE) and (E / E_i). That is, the income elasticity of the demand for good *i* equals the ratio of the marginal share of good *i* to the budget share of good *i*, or

$$\frac{\theta_i}{w_i} = \frac{dE_i}{dE} \frac{E}{E_i} = 1 + \frac{\beta_i}{w_i}. \tag{3.28}$$

As such, good *i* is a luxury good if $\beta_i > 0$ such that income elasticity measure is greater than unity. In contrast, good *i* is a necessity if $\beta_i < 0$ such that income elasticity measure is less than unity.

Florida Slutsky Model

In terms of cross-country data, Working's model would apply only when all countries face the same price data. When this is not the case, it is necessary to incorporate price terms into the model because different countries have different price vectors. Theil et al. (1989) extended Working's model by including prices into the model.

Following Theil et al. (1989), let $\tilde{w}_{ic}$ be the budget share of good *i* at the geometric mean price $\bar{p}_i$ for *i* = 1,…, *n*, and at the observed real income per capita of country *c* (Q_c). Accordingly, Equation 3.24 is modified as

$$\tilde{w}_{ic} = \alpha_i + \beta_i \log Q_c + \varepsilon_{ic}, \tag{3.29}$$

where ε_{ic} is the residual term. Therefore, the observed budget share of good *i* in country *c* can be written as

$$w_{ic} = \alpha_i + \beta_i \log Q_c + (w_{ic} - \tilde{w}_{ic}) + \varepsilon_{ic}, \tag{3.30}$$

where $w_{ic} - \tilde{w}_{ic}$ represents the move from the price vector $[\bar{p}_i]$ to the observed price vector $[p_{ic}]$. The next step is to find the difference $w_{ic} - \tilde{w}_{ic}$ and then substitute the result back into Equation 3.30 to obtain the final form of the extended model.

As such, they totally differentiated $w_i = p_i q_i / E$ and obtained

$$dw_i = w_i d(\log p_i) + w_i d(\log q_i) - w_i d(\log E). \tag{3.31}$$

This indicates that a change in the budget share is the sum of a price component, a quantity component, and an income component, respectively. By adding and subtracting $w_i d(\log P)$ to the right-hand side of Equation 3.31 gives

$$dw_i = w_i[d(\log p_i) - d(\log P)] + w_i d(\log q_i) - w_i[d(\log E) - d(\log P)]. \tag{3.32}$$

Given a budget constraint, $E=\sum_{i=1}^{n}p_i q_i$, totally differentiating the budget constraint and dividing E on both sides of the equation gives

$$\frac{dE}{E}=\frac{\sum_{i=1}^{n}q_i dp_i}{E}+\frac{\sum_{i=1}^{n}p_i dq_i}{E}. \tag{3.33}$$

By using the definition of the budget shares $w_i=(p_i q_i)/E$ and property $d\log x=(1/x)dx$, Equation 3.33 can be written as

$$d(\log E)=\sum_{i=1}^{n}w_i d(\log p_i)+\sum_{i=1}^{n}w_i d(\log q_i). \tag{3.34}$$

Define the Divisia price index and the Divisia volume index as

$$d(\log P)=\sum_{i=1}^{n}w_i d(\log p_i)\text{, and} \tag{3.35}$$

$$d(\log Q)=\sum_{i=1}^{n}w_i d(\log q_i)\text{, respectively.} \tag{3.36}$$

Using these results and substituting the Divisia price index and the Divisia volume index into Equation 3.34 gives

$$d(\log E)=d(\log P)+d(\log Q). \tag{3.37}$$

By substituting Equation 3.37 into Equation 3.32, we can rewrite Equation 3.32 as

$$dw_i=w_i[d(\log p_i)-d(\log P)]+w_i d(\log q_i)-w_i d(\log Q). \tag{3.38}$$

The term $w_i d(\log q_i)$ is the *i*th component of the Divisia volume index. Consider the Frisch price index

$$d(\log P^{*})=\sum_{i=1}^{n}\theta_i d(\log p_i). \tag{3.39}$$

Recall Equations 3.18 and 3.19, by using the expression of the Divisia price index as well as the expression of the Frisch price index, $w_i d(\log q_i)$ can be expressed as

$$w_i d(\log q_i) = \theta_i d(\log Q) + \phi \sum_{j=1}^{n} \theta_{ij} d\left[\log\left(\frac{p_j}{P^*}\right)\right], \tag{3.40}$$

which is the sum of the real income term and the total substitution term, respectively. The real income term is the change in money income deflated by the income effect of price changes. The total substitution term is the specific substitution term deflated by the general substitution term or the Frisch price index. The term ϕ is the income flexibility or the reciprocal of the income elasticity of the marginal utility of income, and $d(\log P^*)$ is the Frisch price index.

In general, Equation 3.40 can be written in the following absolute price form,

$$w_i d(\log q_i) = \theta_i d(\log Q) + \sum_{j=1}^{n} \pi_{ij} d(\log p_j), \tag{3.41}$$

where $\pi_{ij} = \phi(\theta_{ij} - \theta_i \theta_j)$ for the Florida Slutsky model.

The matrix $[\pi_{ij}]$ is an nxn matrix which is negative semi definite of rank n-1. The term π_{ij} is the (i, j) component of the Slutsky coefficient. In addition, the matrix $[\pi_{ij}]$ satisfies both the Slutsky symmetry property

$$\pi_{ij} = \pi_{ji} \tag{3.42}$$

and the demand homogeneity property

$$\sum_{j=1}^{n} \pi_{ij} = 0 \qquad \text{for} \qquad i = 1, \ldots, n. \tag{3.43}$$

If the $\phi\theta_{ij}$ component of the term π_{ij} is greater than zero for some pair of goods (i, j), then an increase in the relative price of the ith (jth) commodity would raise the demand for the *j*th (*i*th) commodity. As such, goods *i* and *j* are specific substitutes of each other. In contrast, if the term $\phi\theta_{ij}$ is less than zero for some pair of (i, j), then goods *i* and *j* are complementary. By incorporating Equation 3.41 into Equation 3.38, we obtain a new form of the total differential of the budget share,

$$dw_i = w_i[d(\log p_i) - d(\log P)] + \theta_i d(\log Q) + \sum_{j=1}^{n} \pi_{ij} d(\log p_j) - w_i d(\log Q) . \quad (3.44)$$

Theil et al. (1989) substituted dw_i from Equation 3.44 for the difference term, $w_{ic} - \widetilde{w}_{ic}$, in Equation 3.30, and assumed that the real income term (Q) was fixed at Q_c such that the term $d(\log Q)$ equaled zero. As a result, the extension of Working's model, where price terms are incorporated, is obtained as follows:

$$w_{ic} = \alpha_i + \beta_i q_c + (\alpha_i + \beta_i q_c)[d(\log p_i) - d(\log P)] + \sum_{j=1}^{n} \pi_{ij} d(\log p_j) + \varepsilon_{ic} , \quad (3.45)$$

where $q_c = \log Q_c$, $d(\log P)$ is the Divisia price index (Equation 3.35), and

$$d(\log p_i) = \log \frac{p_{ic}}{\overline{p}_i} . \quad (3.46)$$

By rewriting Equation 3.45, the final functional form of the Florida Slutsky model can be written as

$$w_{ic} = \alpha_i + \beta_i q_c + (\alpha_i + \beta_i q_c)\left[\log\left(\frac{p_{ic}}{\overline{p}_i}\right) - \sum_{j=1}^{n} (\alpha_j + \beta_j q_c) \log\left(\frac{p_{jc}}{\overline{p}_j}\right)\right]$$

$$+ \sum_{j=1}^{n} \pi_{ij} \log\left(\frac{p_{jc}}{\overline{p}_j}\right) + \varepsilon_{ic} , \quad (3.47)$$

where w_{ic} is the budget share of good *i* (for $i = 1,\ldots, n$) in country *c*, $q_c = \log Q_c$, p_{ic} is the price of good *i* (for $i = 1,\ldots, n$) in country *c*, π_{ij} is the Slutsky price parameter, and ε_{ic} is the residual term of good *i* (for $i = 1,\ldots, n$) in country *c*. It is noted that the term

$\log \bar{p}_i$ (for $i = 1,\ldots, n$) is the natural logarithm of the geometric mean prices of good i across countries. That is,

$$\log \bar{p}_i = \frac{1}{N}\sum_{c=1}^{N} \log p_{ic} , \tag{3.48}$$

where N is the number of countries and p_{ic} is the price of good i (for $i = 1,\ldots, n$) in country c. The minimum distance property presents the justification of using the geometric mean prices as price deflators (Appendix A). The term π_{ij} is constant in the Florida Slutsky model. The final form of the Florida Slutsky model suggests that the model is the sum of a linear real income term, a quadratic pure price term, and a linear substitution term. Weak separability is assumed in the Florida Slutsky model.

Florida PI Model

The Florida Slutsky model can be simplified to the Florida PI model by assuming that preferences are independent. Under the preference independence assumption, total utility function can be written as the sum of n subutility functions, where n represents n individual goods. This means that the Hessian of the total utility function and its inverse are both diagonal matrices. Additionally, because $\theta_{ij} = \mu p_i u^{ij} p_j / \phi E$, the matrix $[\theta_{ij}]$ is also a diagonal matrix. This means that $\theta_{ij} = \theta_i$ when $i = j$, and $\theta_{ij} = 0$ when $i \neq j$. The resulting restriction simplifies the term π_{ij} under the Florida PI model. As a result, under preference independence, Equation 3.41 can be written as

$$w_i d(\log q_i) = \theta_i d(\log Q) + \sum_{j=1}^{n} \pi_{ij} d(\log p_j) , \tag{3.49}$$

where $\pi_{ij} = \begin{cases} \phi\theta_i(1-\theta_i) & ;i = j \\ -\phi\theta_i\theta_j & ;i \neq j \end{cases}$ for the Florida PI model.

The matrix $[\pi_{ij}]$ satisfies both the Slutsky symmetry property and demand homogeneity. Following the same procedure described in an earlier section, the preliminary form of the Florida PI model equals

$$w_{ic} = \alpha_i + \beta_i q_c + (\alpha_i + \beta_i q_c)\left[\log\left(\frac{p_{ic}}{\bar{p}_i}\right) - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c)\log\left(\frac{p_{jc}}{\bar{p}_j}\right)\right]$$

$$+ \phi\theta_i \log\left(\frac{p_{ic}}{\bar{p}_i}\right) - \phi\theta_i \sum_{j=1}^{n}\theta_j \log\left(\frac{p_{jc}}{\bar{p}_j}\right) + \varepsilon_{ic} \,. \tag{3.50}$$

Given that the marginal share of good i (θ_i) is the sum of w_i and β_i, it can be verified that

$$\theta_i = \alpha_i + \beta_i q_c^*, \tag{3.51}$$

where $q_c^* = 1 + q_c$. As such, the final functional form of the Florida PI model is

$$w_{ic} = \alpha_i + \beta_i q_c + (\alpha_i + \beta_i q_c)\left[\log\left(\frac{p_{ic}}{\bar{p}_i}\right) - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c)\log\left(\frac{p_{jc}}{\bar{p}_j}\right)\right]$$

$$+ \phi(\alpha_i + \beta_i q_c^*)\left[\log\left(\frac{p_{ic}}{\bar{p}_i}\right) - \sum_{j=1}^{n}(\alpha_j + \beta_j q_c^*)\log\left(\frac{p_{jc}}{\bar{p}_j}\right)\right] + \varepsilon_{ic}, \tag{3.52}$$

where w_{ic} is the budget share of good i (for $i = 1,\ldots, n$) in country c, $q_c = \log Q_c$, p_{ic} is the price of good i (for $i = 1,\ldots, n$) in country c, $\bar{p}_i$ is the geometric mean prices of good i across countries, ϕ is the income flexibility, $q_c^* = 1 + q_c$, and ε_{ic} is the residual term of good i (for $i = 1,\ldots, n$) in country c. Unlike the Florida Slutsky model, the Florida PI model is the sum of a linear real income term, a quadratic pure price term, and a substitution term.

Method of Scoring

A general approach to obtain the solutions to the non-linear estimation problem requires the application of an iterative algorithm. This iterative process starts by a trial solution. In the end, the final solution is the sum of the trial solution and the correction terms. The basic idea is to update the solution until the convergence is reached or until the correction terms become negligible (Rao, 1973). For the maximum likelihood estimation, the focus is on maximizing the log-likelihood function $L(\theta)$ with respect to the parameter θ. The solution to this problem is the parameter θ such that $d(\log L)/d\theta$ = 0. Let θ_0 be the initial value of the trial solution, a Taylor series approximation of $d(\log L)/d\theta$ around θ_0 is

$$\frac{d(\log L)}{d\theta} \approx \frac{d(\log L)}{d\theta_0} + \frac{d^2(\log L)}{d\theta_0^2}\delta\theta, \tag{3.53}$$

where $\delta\theta = \theta - \theta_0$. Let $I(\theta_0)$ be the expected value of $-d^2(\log L)/d\theta_0^2$, Equation 3.53 can be rewritten as

$$\frac{d(\log L)}{d\theta} \approx \frac{d(\log L)}{d\theta_0} - I(\theta_0)\delta\theta. \tag{3.54}$$

The term $\delta\theta$ is also known as the correction term. It can be found by setting $d(\log L)/d\theta$ to zero and solving for $\delta\theta$. As such,

$$\delta\theta = I^{-1}(\theta_0)\frac{d(\log L)}{d\theta_0}. \tag{3.55}$$

In each round, the approximation of the parameter θ in the method of scoring takes the form

$$\theta = \theta_0 + I^{-1}(\theta_0)\frac{d(\log L)}{d\theta_0}. \tag{3.56}$$

That is,

$$\theta = \theta_0 - [E(H_0)]^{-1} g_0, \tag{3.57}$$

where $E(H_0)^{-1}$ represents the inverse of the expected value of the Hessian matrix of the log-likelihood function evaluated at θ_0 and g_0 is the gradient of the log-likelihood function evaluated at θ_0. It is noted that the negative of the expected value of the Hessian matrix of the log-likelihood function is also known as the information matrix of the log-likelihood function.

Many iterative procedures have been introduced in the past, including the Newton-Raphson method; the Gauss-Newton method; and the Berndt, Hall, Hall, and Hausman (BHHH) method. Unlike the method of scoring, the Newton-Raphson method uses the inverse of the Hessian matrix of the log-likelihood function instead of using its expectation. Although the Newton-Raphson method is faster in terms of convergence, the obtained correction term is far more complicated. While both the method of scoring and the Newton-Raphson method involve the use of the second derivatives or the Hessian matrix of the log-likelihood function in the iterative process, the Gauss-Newton method and the BHHH method employ only the first derivatives of the log-likelihood function.

In our research, the method of scoring is the most convenient method for the maximum likelihood estimation. The presence of the information matrix proves to be useful to the parameter updating process. In fact, by assuming that the error terms are independent normal vectors with zero mean and nonsingular covariance matrix Σ, the component of the information matrix associated with the error terms vanishes. The obtained correction term will be less complicated than that based on the Hessian matrix. Therefore, the method of scoring will be employed in the estimation of parameters.

Information Inaccuracy Measures

Information inaccuracy measures are from the concept of information theory. Consider the information that event E_i will occur as a decreasing function of x_i, which is the probability that independent event E_i will occur. Theil (1965) identified the functional form of the information measure as $\log(1/x_i)$. This shows the amount of information gained, given the knowledge that the ith event has occurred. The expected information is written as follows:

$$\text{Expected information} = \sum_i x_i \log\left(\frac{1}{x_i}\right) = -\sum_i x_i \log x_i . \tag{3.58}$$

Tilanus and Theil (1965) applied this information concept to evaluate the quality of decomposition forecasts. They defined p_i as the initial probability of independent event E_i (for $i = 1,\ldots, n$). Given that there exists a message regarding the event that changes the probability from p_i to q_i (for $i = 1,\ldots, n$) and the corresponding forecast p_i and the realization q_i satisfy the following conditions:

$$p_i \geq 0, \quad \sum_{i=1}^{n} p_i = 1. \tag{3.59}$$

$$q_i \geq 0, \quad \sum_{i=1}^{n} q_i = 1. \tag{3.60}$$

Therefore, the information of the message or the information of the realization, given the forecast, is defined as

$$I(q:p) = \sum_i q_i \log\left(\frac{q_i}{p_i}\right). \tag{3.61}$$

This is also known as the information inaccuracy. The information inaccuracy is positive when the pairwise realizations and forecasts differ. In contrast, when the realizations and the forecasts are pairwise equal, the information inaccuracy equals zero.

> For if the realization provides little information beyond what the forecast told us, the forecast can be considered accurate. By contrast, if the realization contains a good deal of information, given the forecast which was made before, the forecast is to be regarded as poor. (Tilanus and Theil 1965, p. 850)

The concept of information inaccuracy can be applied to identify the fit of the demand system. It enhances the ability to quantify the quality of the information of the forecasts, given the observed values. In our study, the realization is the observed budget share of good i (for $i = 1,\dots, n$) in country c (w_{ic}), while the forecast is the predicted budget share of good i (for $i = 1,\dots, n$) in country c ($\hat{w}_{ic}$). Recall that the observed and the predicted budget shares of good i in country c are both positive and the sum over goods equals one. These satisfy the required conditions in Equations 3.59 and 3.60. As a result, the information inaccuracy for country c can be written as

$$I_c = \sum_{i=1}^{n} w_{ic} \log\left(\frac{w_{ic}}{\hat{w}_{ic}}\right), \tag{3.62}$$

where w_{ic} is the observed budget share of good i (for $i = 1,\dots, n$) in country c, and $\hat{w}_{ic}$ is the predicted budget share of good i (for $i = 1,\dots, n$) in country c. This can also be viewed as the information obtained from the observed budget shares, given the predicted budget shares. If the information inaccuracy value is small, it implies that the gap between the observed budget shares and the predicted budget share is small. As such, the predicted budget shares are somewhat accurate. However, the prediction of the budget shares will be highly inaccurate if the gap between the observed budget shares and the predicted budget shares becomes larger which in turn yields large information inaccuracy values.

The information inaccuracy can be decomposed into *n* Strobel measures, where *n* is the number of goods. The Strobel measure of good *i* in country *c* is

$$I_{ic} = \hat{w}_{ic} - w_{ic} + \sum_{i=1}^{n} w_{ic} \log\left(\frac{w_{ic}}{\hat{w}_{ic}}\right). \tag{3.63}$$

Therefore, the information inaccuracy, which is simply the sum of *n* Strobel measures, can also be defined as

$$I_c = \sum_{i=1}^{n} I_{ic}\,. \tag{3.64}$$

The decomposition of the information inaccuracy has the advantage of identifying the equation where the least likely fit has occurred.

Methodology and Estimation Procedure

Our research will provide parameter estimates for individual years and for pooled data. In brief, parameters estimation for individual years uses the method of maximum likelihood, while the parameters estimation for pooled data uses the first-order autoregressive, AR(1), corrected maximum likelihood estimation procedure to estimate the unknown parameters. The fundamental of the maximum likelihood estimation is to estimate the unknown parameters such that the log-likelihood function is maximized. Details of the methodology and estimation procedure will be discussed in Chapters 4, 5, 6, and 7. These estimated unknown parameters are substituted back into the Florida PI model (for the analysis of broad consumption groups) and the Florida Slutsky model (for the analysis of the food subgroups) which gives the predicted budget share of good *i* in country *c*. The predicted budget share and the observed budget share will be used to calculate information inaccuracy measures. These information inaccuracy measures will determine the outlying observations. For instance, in our research, countries with information inaccuracy measures equal to or larger than 0.10 are declared outliers. After excluding the outlying observations, the maximum likelihood estimation procedure is performed for the remaining observations. The estimation procedure follows an iterative process called the method of scoring. Parameters were given the initial set of trial solution that will be used to calculate the first-order derivative and the second-order derivative of the log-likelihood function. The first- and second-order derivatives of the log-likelihood function will later be used as part of an updating process where the final solution of the parameter estimate is the difference between the trial solution and the product of the inverse of the expected value of the second-order derivative of the log-likelihood function and the first-order derivative of the log-likelihood function. The iterative process continues until reaching convergence. The final solution of the estimated parameters will be used to calculate the estimated demand elasticities.

CHAPTER 4
ANALYSIS OF INDIVIDUAL YEAR: THE BROAD CONSUMPTION GROUPS

It has been pointed out that the separability of the utility function contributes to the introduction of the utility tree of the demand allocation. This in turn creates the concept of multi-stage budgeting where consumers allocate their total expenditure among different consumption groups or commodity groupings within each branch of the utility tree. In the two-stage budgeting process, the allocation process can be formed into two stages. This chapter covers individual year results and the estimation method of the first stage of the allocation process (i.e., the allocation of total expenditure to nine broad consumption groups).

Allocation to Broad Consumption Groups

The main assumption of the allocation to broad groups is the preference independence assumption. The allocation to broad groups is defined as the first stage of the budgeting process. This stage associates with the allocation of total expenditure into different broad groups and the use of relative group prices. Consumers maximize their utility function based on their total real expenditures. Given the assumption of preference independence, the utility function is the sum of *n* subutility functions, where *n* represents different broad consumption groups. In our study, consumers allocate total expenditure into nine broad groups:

- Food, beverages, and tobacco
- Clothing and footwear
- Gross rent, fuel, and power
- House furnishings and operations
- Medical care

- Transport and communications
- Recreation
- Education
- Other expenditures

The Florida PI model is appropriate for the analysis of the broad consumption groups when preferences are independent. The block diagonal property and the positive definiteness property of the matrix $[\theta_{ij}]$ ensure that none of the nine groups can be inferior. Income elasticities obtained from this stage measure percentage change in quantity demanded from a one percentage change in total real expenditure. In the same manner, the own-price elasticity in this stage measures percentage change in quantity demanded from a one percentage change in the relative group prices of the same group.

Maximum Likelihood Estimates for Broad Consumption Groups

Our analysis starts by fitting the Working's model (1943) to the food, beverages, and tobacco category. Note that this category includes food consumed at home and food consumed away from home. Figures 4.1 to 4.5 show a scatter plot between the budget share of the demand for food, beverages, and tobacco and the natural logarithm of real income per capita. These scatter plots indicate an inverse relationship between the budget share of the demand for food, beverages, and tobacco and the natural logarithm of total real income per capita. Turkey is clearly an outlying observation in 1985, 1990, and 1993.

Next, the Florida PI model was fitted to each round of the OECD data. Parameters are reported and discussed for each individual round. Finally, income and price sensitivity measures are presented and discussed. Strobel and the information inaccuracy measures were calculated to identify potential outlying observations. Following Theil et al. (1989), countries with information inaccuracies equal to or greater than 0.10 are declared outliers, which will be omitted later from the estimation. Tables 4.1 to 4.5 provide the Strobel and the information inaccuracy measures between 1985 and 1999 based on the full data set. Countries were sorted by the percentage shares of their real income per capita with respect to that of the United States (i.e., the real income per capita of the United States was set to one). Because Strobel and information inaccuracy measures were reported as a fraction of 10,000, countries with information inaccuracies equal to or greater than 1,000 will be declared outliers.

Tables 4.1, 4.3, and 4.4 show that Turkey is an outlier country in 1985, 1993, and 1996, respectively. The Strobel measures reveal that medical care is the major source of the lack of fit. The estimations give an undefined information inaccuracy measure for Turkey because of its negative predicted budget share. In 1990, although the information inaccuracy measure of Turkey was less than 0.10, a scatter plot between the budget share of the demand for food, beverages, and tobacco and the natural logarithm of real income per capita (Figure 4.2) suggests that Turkey should be defined as an outlier and omitted from the parameter estimation. In 1999, Malta was the only outlying observation with its approximate information inaccuracy measure equal to 0.15 (1,454 out of 10,000). The gross rent, fuel, and power category and the other expenditures category are the major sources of lack of fit.

The Florida PI model was refitted to the remaining countries after the outlier was omitted from the parameter estimation. Table 4.6 shows parameter estimates of the broad consumption categories and their respective asymptotic standard errors from 1985 to 1999. The β coefficient is a quick indicator of whether a particular category is a necessity, a luxury, or has unitary income elasticity. Because our income elasticities are evaluated at the geometric mean prices, a negative β coefficient would indicate that a particular category is a necessity. Conversely, a particular category is a luxury when its β coefficient is positive. Unitary income elasticity is obtained when the β coefficient equals zero.

Overall, parameter estimates indicate that the food, beverages, and tobacco and the clothing and footwear categories are necessities in every round due to the negative β coefficient. The β coefficients for food, beverages, and tobacco are statistically significant at the 5% level in every round, with values ranging from -0.189 in 1985 to -0.188 in 1990, -0.180 in 1993, -0.105 in 1996, and -0.107 in 1999. The β coefficient for clothing and footwear is statistically significant at the 5% level in 1985, but the estimates are not statistically significant at the 5% level in 1990, 1993, 1996, and 1999. The β coefficients for clothing and footwear range from -0.016 in 1985 to -0.011 in 1990, -0.007 in 1993, -0.012 in 1996, and -0.002 in 1999. The gross rent, fuel, and power category is a luxury in 1985, 1990, and 1996 but a necessity in 1993 and 1999. The β coefficients for the gross rent, fuel, and power category range from 0.052 (statistically significant at the 5% level) in 1985 to 0.047 (statistically significant at the 5% level) in 1990, -0.003 in 1993, 0.001 in 1996, and -0.035 (statistically significant at the 5% level) in 1999. The house furnishings and operations category is a necessity in 1985, with the β coefficient equaling -0.004 (not statistically significant at the 5% level). From 1990 to 1999, the house furnishings and operations is a luxury, with β coefficients ranging from 0.001 in 1990 to 0.013 in 1993, 0.015 (statistically significant at the 5% level) in 1996, and 0.017 (statistically significant at the 5% level) in 1999.

Medical care is a luxury in every round. The β coefficients for medical care are statistically significant at the 5% level from 1985 to 1996, with values ranging from 0.060 in 1985 to 0.087 in 1990, 0.113 in 1993, and 0.066 in 1996. However, the β coefficient for medical care equals 0.019 in 1999 and is not statistically significant at the 5% level. The transport and communications category is also a luxury in every round. The β coefficients for transport and communications range from 0.019 in 1985 to 0.016 in 1990, 0.003 in 1993, 0.023 (statistically significant at the 5% level) in 1996, and 0.018 (statistically significant at the 5% level) in 1999. Similarly, recreation is a luxury, with β coefficients ranging from 0.017 in 1985 to 0.010 in 1990, 0.007 in 1993, 0.026 (statistically significant at the 5% level) in 1996, and 0.029 (statistically significant at the 5% level) in 1999. Education is a luxury in 1985, 1990, and 1999. The β coefficients for education range from 0.021 in 1985 to 0.012 in 1990, 0.000 in 1993, -0.033 in 1996, and 0.032 (statistically significant at the 5% level) in 1999. Finally, the other expenditures category is a luxury. The β coefficients for other expenditures are statistically significant at the 5% level in every round, with values ranging from 0.041 in 1985 to 0.027 in 1990, 0.055 in 1993, 0.019 in 1996, and 0.030 in 1999. These parameter estimates will be used to obtain income and own-price elasticities (Appendix B).

Maximum Likelihood Procedure for the Florida PI Model

Disregarding the *n*th equation, the Florida PI model from Equation 3.52 can be rewritten for $i = 1,\ldots, n\text{-}1$ as

$$\begin{aligned} w_{ic} &= \alpha_i + \beta_i q_c + (\alpha_i + \beta_i q_c)\left[x_{ic} - \sum_{j=1}^{n-1} (\alpha_j + \beta_j q_c) x_{jc} \right] \\ &+ \phi(\alpha_i + \beta_i q_c^*)\left[x_{ic} - \sum_{j=1}^{n-1} (\alpha_j + \beta_j q_c^*) x_{jc} \right] + \varepsilon_{ic}, \qquad (4.1) \end{aligned}$$

where $x_{ic} = \log(p_{ic}/\overline{p}_i) - \log(p_{nc}/\overline{p}_n)$, w_{ic} is the budget share of good *i* in country *c*, $q_c = \log Q_c$, p_{ic} is the price of good *i* in country *c*, $\overline{p}_i$ is the geometric mean prices of good *i* across countries, ϕ is the income flexibility, $q_c^* = 1 + q_c$, and ε_{ic} is the residual term of good *i* in country *c*. A simple matrix notation of the Florida PI model can be expressed as

$$w_c = f_c(\theta) + \varepsilon_c, \tag{4.2}$$

where θ is the parameter vector of $2n$-1 elements that consist of n-1 elements of subvector α, n-1 elements of subvector β, and one element of subvector ϕ. The terms w_c and ε_c are column vectors of n-1 elements. It is noted that $f_c(\theta)$ is defined as

$$\begin{aligned} f_c(\theta) &= \alpha + q_c\beta + X_c(\alpha + q_c\beta) - (\alpha + q_c\beta)x_c^T(\alpha + q_c\beta) \\ &+ \phi X_c(\alpha + q_c^*\beta) - \phi(\alpha + q_c^*\beta)x_c^T(\alpha + q_c^*\beta), \end{aligned} \tag{4.3}$$

where X_c is the diagonal matrix of order n-1 with x_{ic} as the ith diagonal element, and x_c is the column vector (x_c^T is its transpose) with x_{ic} as its ith element ($i = 1,\ldots, n$-1).

For $c = 1,\ldots, N$ and $\varepsilon_c \sim N(0, \Sigma)$, the log-likelihood function of the Florida PI model is defined as

$$L = \text{constant} + \frac{1}{2}N\log\left|\Sigma^{-1}\right| - \frac{1}{2}\sum_{c=1}^{N}[w_c - f_c(\theta)]^T\Sigma^{-1}[w_c - f_c(\theta)]. \tag{4.4}$$

Due to the presence of two unknown parameters (θ and Σ) in the log-likelihood function, it is worthwhile to transform the log-likelihood function to the concentrated log-likelihood function so that the solution of the optimization problem can be written as an explicit function of the other solution of the problem. In other words, the concentrated log-likelihood function can be derived by calculating the first-order derivatives of the log-likelihood function with respect to Σ given θ and setting the equation to zero. This gives the solution for Σ which can be written as a function of θ. Let $R(\theta)$ be the solution for Σ as a function of θ, thus the concentrated log-likelihood function of the Florida PI model is

$$L^* = \text{constant} + \frac{1}{2} N \log\left|R(\theta)^{-1}\right|, \text{ where} \tag{4.5}$$

$$R(\theta) = \frac{1}{N}\sum_{c=1}^{N}[w_c - f_c(\theta)][w_c - f_c(\theta)]^T . \tag{4.6}$$

The first-order derivatives of concentrated log-likelihood function of the Florida PI model with respect to θ is

$$\frac{dL^*}{d\theta} = \sum_{c=1}^{N}\left[\frac{df_c(\theta)}{d\theta^T}\right]^T R(\theta)^{-1}[w_c - f_c(\theta)], \tag{4.7}$$

where $df_c(\theta)/d\theta^T$ consists of three submatrices. Three submatrices of $df_c(\theta)/d\theta^T$ can be expressed as

$$\frac{df_c(\theta)}{d\alpha^T} = A + B, \tag{4.8}$$

$$\frac{df_c(\theta)}{d\beta^T} = q_c A + q_c^* B, \text{ and} \tag{4.9}$$

$$\frac{df_c(\theta)}{d\phi} = X_c(\alpha + q_c^*\beta) - (\alpha + q_c^*\beta)x_c^T(\alpha + q_c^*\beta), \tag{4.10}$$

where $A = X_c - (\alpha + q_c\beta)x_c^T + [1 - (\alpha + q_c\beta)^T x_c]I_{n-1}$ and

$$B = \phi X_c - \phi(\alpha + q_c^*\beta)x_c^T - \phi(\alpha + q_c^*\beta)^T x_c I_{n-1}$$

with I_{n-1} as the identity matrix of order n-1. The Hessian matrix or the second-order derivatives of L^* with respect to θ is

$$\frac{d^2L^*}{d\theta d\theta^T} = K(\theta) + J(\theta), \text{ where} \tag{4.11}$$

$$K(\theta) = -\sum_{c=1}^{N} \left[\frac{df_c(\theta)}{d\theta^T} \right]^T R(\theta)^{-1} \left[\frac{df_c(\theta)}{d\theta^T} \right] \text{ and } \tag{4.12}$$

$J(\theta)$ is a matrix that is linear in $w_c - f_c(\theta)$ for $c = 1, \ldots, N$. The asymptotic covariance matrix of the maximum likelihood estimator of θ is $-K(\theta)^{-1}$. The maximum likelihood estimates $\hat{\theta}$ can be obtained using the method of scoring. The asymptotic standard errors are the square root of the diagonal elements of the asymptotic covariance matrix.

Table 4.1. Strobel measures and information inaccuracies for broad consumption groups in 1985

Country	Strobel measure									Information inaccuracy
	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures	
United States	23	13	21	2	11	1	12	8	0	90
Canada	9	0	1	19	139	3	0	40	0	211
Luxembourg	3	3	0	12	6	14	136	3	0	176
France	12	1	9	3	154	13	12	19	6	228
Germany	21	14	4	8	234	5	3	31	17	338
Italy	24	24	21	1	5	31	0	1	1	108
Australia	0	13	15	0	9	0	11	3	9	60
Japan	15	0	5	19	61	71	7	3	116	296
Belgium	1	1	2	24	36	34	14	11	6	129
Netherlands	19	0	1	1	118	61	20	0	29	249
Denmark	12	2	58	2	175	4	4	45	41	344
United Kingdom	0	4	9	8	257	4	19	14	14	329
New Zealand	15	6	28	2	7	90	17	0	0	166
Sweden	80	1	148	1	197	11	52	38	88	615
Norway	44	1	0	4	34	24	6	25	0	137
Austria	0	49	1	4	45	6	19	0	6	132
Finland	1	44	4	8	72	24	17	25	6	201
Spain	87	20	4	11	2	2	21	44	2	193
Greece	64	3	61	6	15	8	38	42	7	245
Ireland	17	17	9	45	2	2	19	1	3	116
Portugal	2	0	4	2	63	2	21	0	4	99
Turkey	2	42	11	40	*i*	155	26	147	40	*i*
Average	21	12	19	10	*i*	26	22	23	18	*i*

Note: All entries are to be divided by 10,000 and *i* represents an undefined number.

Table 4.2. Strobel measures and information inaccuracies for broad consumption groups in 1990

Country	Strobel measure									Information inaccuracy
	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures	
United States	1	20	0	14	168	15	7	3	15	242
Luxembourg	1	5	2	33	11	5	189	16	21	283
Switzerland	23	18	0	42	47	14	91	1	90	325
Italy	12	40	19	10	18	54	0	4	47	203
Germany	22	2	0	3	189	2	0	27	6	251
France	0	9	0	1	38	2	9	6	1	68
Canada	20	0	23	9	73	2	5	15	22	170
Belgium	1	0	17	62	44	17	11	1	23	178
Japan	1	35	1	3	1	48	8	29	13	139
Austria	1	32	4	1	108	9	11	1	22	189
Iceland	2	2	4	9	174	0	37	3	1	232
United Kingdom	14	0	6	2	341	24	8	19	0	414
Denmark	14	32	136	14	219	1	1	84	43	544
Netherlands	25	0	1	5	177	38	26	1	6	279
Australia	5	27	0	5	5	0	41	2	15	101
Sweden	67	6	48	1	179	23	17	25	21	387
New Zealand	23	22	14	31	4	34	10	2	1	140
Finland	4	33	3	6	30	37	33	38	10	193
Norway	14	0	0	0	2	5	20	50	0	92
Spain	95	6	69	12	25	20	34	23	0	283
Portugal	85	1	31	12	1	24	109	2	43	307
Ireland	50	12	168	13	5	0	51	4	34	337
Greece	82	0	153	0	0	5	4	32	4	280
Turkey	118	19	162	6	262	81	2	2	15	667
Average	28	13	36	12	88	19	30	16	19	263

Note: All entries are to be divided by 10,000.

Table 4.3. Strobel measures and information inaccuracies for broad consumption groups in 1993

Country	Strobel measure									Information inaccuracy
	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures	
Luxembourg	18	7	0	53	83	36	205	4	20	426
United States	0	8	12	3	56	2	0	11	0	92
Switzerland	1	4	29	1	2	15	2	2	34	90
Belgium	11	4	80	56	39	8	24	10	7	239
Japan	3	1	0	20	81	36	2	2	11	156
Germany	34	2	2	5	219	2	2	50	14	330
Canada	14	3	33	11	91	0	13	10	8	184
France	1	8	0	1	86	2	8	1	18	126
Italy	2	26	0	10	2	27	0	14	6	86
Netherlands	73	1	12	1	149	21	15	5	102	379
Austria	1	20	6	0	102	4	15	4	29	181
Australia	0	38	6	2	0	4	52	2	6	109
Iceland	1	2	11	4	227	1	13	7	5	269
United Kingdom	0	2	0	11	252	9	22	1	39	336
Denmark	11	11	74	8	231	1	4	110	15	465
Norway	9	1	21	0	0	28	7	28	7	102
New Zealand	10	28	7	0	1	11	8	1	1	67
Sweden	95	0	225	2	120	8	24	2	104	580
Spain	163	9	96	11	4	7	41	27	8	367
Portugal	92	1	283	1	0	0	43	34	1	453
Finland	29	36	58	28	1	3	29	33	37	253
Greece	231	5	128	0	1	30	37	101	19	551
Ireland	5	0	42	5	2	20	21	25	17	137
Turkey	56	5	10	19	*i*	21	13	6	41	*i*
Average	36	9	47	10	*i*	12	25	20	23	*i*

Note: All entries are to be divided by 10,000 and *i* represents an undefined number.

Table 4.4. Strobel measures and information inaccuracies for broad consumption groups in 1996

Country	Strobel measure									Information inaccuracy
	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures	
United States	0	5	17	21	241	9	15	6	1	315
Luxembourg	30	24	29	38	30	0	35	2	4	192
Switzerland	7	5	15	33	99	40	14	9	0	223
Japan	15	0	2	13	164	41	6	9	1	251
Belgium	0	1	2	33	68	21	34	0	8	167
Germany	35	2	2	1	201	4	5	49	14	312
Canada	7	8	20	0	85	0	6	12	1	139
Australia	0	33	0	2	1	0	48	6	0	91
Iceland	5	8	5	3	248	12	22	2	10	315
Netherlands	39	1	12	0	104	17	3	11	107	294
Austria	1	11	1	4	58	3	2	1	0	81
Italy	1	40	4	20	4	19	1	15	15	119
Denmark	9	3	81	6	239	15	1	38	48	439
France	0	3	0	2	73	5	15	3	18	119
United Kingdom	1	0	0	1	295	16	9	5	89	416
Norway	17	2	21	0	149	3	6	8	0	207
New Zealand	0	38	12	1	0	11	4	21	8	95
Spain	166	4	112	4	6	7	50	22	0	370

Note: All entries are to be divided by 10,000 and *i* represents an undefined number.

Table 4.4. Continued

Country	Strobel measure									Information inaccuracy
	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures	
Israel	37	16	26	15	11	1	1	88	12	207
Sweden	74	9	225	3	13	10	6	0	152	492
Ireland	12	0	35	3	17	2	6	4	14	93
Finland	25	38	31	12	0	8	19	19	21	173
Portugal	75	7	215	0	1	4	16	17	8	343
Greece	65	51	3	1	0	118	44	80	4	366
Slovenia	0	3	6	19	87	84	5	4	0	209
Czech Republic	10	6	1	1	277	14	131	17	5	462
Hungary	11	33	22	4	48	10	29	0	7	164
Mexico	1	44	210	24	17	41	48	13	158	557
Slovak Republic	18	19	16	33	21	22	12	20	20	180
Poland	1	47	7	26	72	0	7	17	3	179
Russian Federation	16	126	60	15	16	0	7	18	43	303
Turkey	0	0	25	116	*i*	14	78	77	35	*i*
Average	21	18	38	14	*i*	17	21	18	25	*i*

Note: All entries are to be divided by 10,000 and *i* represents an undefined number

Table 4.5. Strobel measures and information inaccuracies for broad consumption groups in 1999

Country	Strobel measure									Information inaccuracy
	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures	
Luxembourg	43	7	13	10	14	18	72	40	28	246
United States	11	0	0	41	736	26	8	16	6	845
Switzerland	19	18	38	47	449	67	30	18	56	743
Cyprus	98	34	375	39	0	4	14	55	84	705
Austria	0	1	0	9	42	5	6	0	3	67
Iceland	14	5	1	1	51	0	4	3	56	135
Italy	0	59	13	31	35	2	23	19	2	183
Canada	36	1	36	2	15	9	10	0	8	118
Denmark	7	6	121	16	68	2	8	0	14	242
Germany	11	2	24	1	8	9	1	32	5	91
Australia	1	18	3	5	4	0	66	1	9	106
United Kingdom	0	2	0	2	173	5	42	57	17	297
Norway	14	0	46	4	54	0	14	1	8	142
France	4	7	27	3	17	5	1	0	0	64
Belgium	22	8	25	16	14	2	0	24	4	115
Netherlands	27	0	4	2	6	1	22	4	12	77
Japan	14	2	70	7	13	10	4	36	16	171
Spain	123	0	81	5	15	1	2	3	5	235
Ireland	35	15	5	4	46	7	24	11	10	157
New Zealand	4	22	26	0	90	5	31	0	24	202
Sweden	68	3	229	29	49	1	23	8	19	427
Greece	70	136	8	0	16	57	95	19	16	417
Portugal	0	9	118	2	0	26	33	49	0	238

Note: All entries are to be divided by 10,000.

Table 4.5. Continued

Country	Strobel measure									Information inaccuracy
	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures	
Finland	8	17	46	32	6	4	37	0	42	191
Israel	28	49	33	19	0	20	1	134	17	302
Malta	1	0	834	40	4	32	1	13	528	1,454
Slovenia	6	1	23	7	38	37	18	24	0	153
Korea	32	35	70	7	135	56	2	58	15	410
Czech Republic	27	33	10	0	85	46	25	17	13	256
Estonia	2	13	36	11	53	18	0	16	1	150
Hungary	9	10	0	10	24	27	1	5	0	87
Slovak Republic	53	13	0	1	116	33	0	11	5	231
Lithuania	8	5	22	9	1	3	4	21	0	73
Mexico	4	47	283	77	20	122	81	58	13	706
Poland	8	18	22	2	31	1	0	0	1	83
Bulgaria	267	4	1	38	398	3	27	6	79	823
Croatia	2	103	5	1	29	101	13	30	10	293
Latvia	1	33	0	41	10	38	3	32	3	163
Turkey	0	47	10	102	1	61	65	0	12	297
Macedonia	13	2	18	16	0	25	56	13	2	145
Russian Federation	1	169	121	10	17	1	1	22	2	343
Romania	16	27	3	44	27	34	27	40	0	217
Ukraine	78	20	53	14	10	15	14	3	1	207
Average	28	23	66	18	68	22	21	21	27	293

Note: All entries are to be divided by 10,000.

Table 4.6. Parameter estimates for broad consumption groups between 1985 and 1999

Parameters/Consumption categories	1985		1990		1993		1996		1999	
Income flexibility (ϕ)	-0.628*	(0.060)	-0.601*	(0.069)	-0.506*	(0.073)	-0.698*	(0.058)	-0.747*	(0.036)
Beta (β)										
Food, beverages, and tobacco	-0.189*	(0.022)	-0.188*	(0.025)	-0.180*	(0.032)	-0.105*	(0.014)	-0.107*	(0.012)
Clothing and footwear	-0.016*	(0.007)	-0.011	(0.009)	-0.007	(0.009)	-0.012	(0.006)	-0.002	(0.004)
Gross rent, fuel, and power	0.052*	(0.022)	0.047	(0.024)	-0.003	(0.035)	0.001	(0.019)	-0.035*	(0.014)
House furnishings and operations	-0.004	(0.006)	0.001	(0.010)	0.013	(0.011)	0.015*	(0.004)	0.017*	(0.003)
Medical care	0.060*	(0.020)	0.087*	(0.025)	0.113*	(0.028)	0.066*	(0.019)	0.019	(0.009)
Transport and communications	0.019	(0.013)	0.016	(0.016)	0.003	(0.015)	0.023*	(0.009)	0.018*	(0.007)
Recreation	0.017	(0.011)	0.010	(0.015)	0.007	(0.014)	0.026*	(0.007)	0.029*	(0.004)
Education	0.021	(0.013)	0.012	(0.018)	0.000	(0.024)	-0.033	(0.018)	0.032*	(0.010)
Other expenditures	0.041*	(0.011)	0.027*	(0.010)	0.055*	(0.017)	0.019*	(0.007)	0.030*	(0.003)
Alpha (α)										
Food, beverages, and tobacco	0.188*	(0.014)	0.201*	(0.012)	0.178*	(0.017)	0.195*	(0.010)	0.203*	(0.011)
Clothing and footwear	0.059*	(0.005)	0.064*	(0.005)	0.060*	(0.005)	0.054*	(0.005)	0.059*	(0.004)
Gross rent, fuel, and power	0.201*	(0.013)	0.195*	(0.011)	0.182*	(0.017)	0.186*	(0.013)	0.162*	(0.012)
House furnishings and operations	0.069*	(0.004)	0.073*	(0.005)	0.074*	(0.005)	0.073*	(0.003)	0.074*	(0.004)
Medical care	0.083*	(0.013)	0.095*	(0.012)	0.113*	(0.013)	0.099*	(0.013)	0.054*	(0.008)
Transport and communications	0.150*	(0.009)	0.151*	(0.008)	0.137*	(0.008)	0.150*	(0.007)	0.161*	(0.007)
Recreation	0.073*	(0.007)	0.078*	(0.008)	0.075*	(0.007)	0.088*	(0.005)	0.101*	(0.005)
Education	0.092*	(0.008)	0.088*	(0.008)	0.082*	(0.010)	0.067*	(0.010)	0.094*	(0.008)
Other expenditures	0.086*	(0.007)	0.055*	(0.005)	0.098*	(0.008)	0.088*	(0.006)	0.092*	(0.004)

Note: Asymptotic standard errors of the associated parameters are shown in parentheses and * denotes statistically significant at the 5% level.

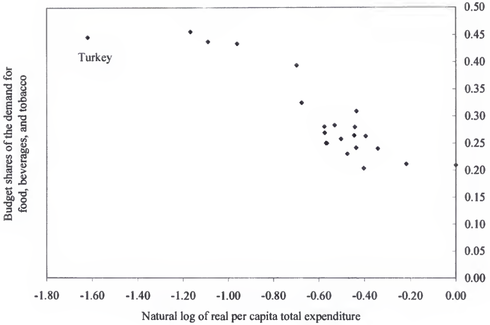

Figure 4.1. Scatter plot between budget share of the demand for food, beverages, and tobacco and the natural logarithm of real per capita total expenditure, 1985

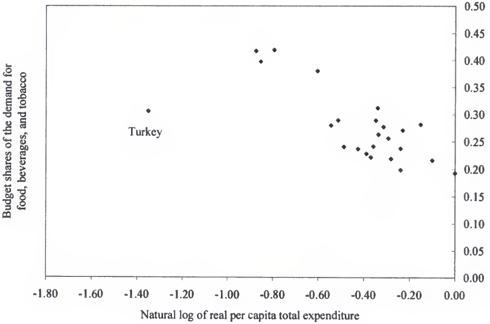

Figure 4.2. Scatter plot between budget share of the demand for food, beverages, and tobacco and the natural logarithm of real per capita total expenditure, 1990

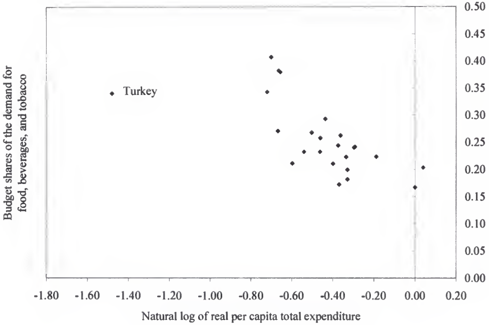

Figure 4.3. Scatter plot between budget share of the demand for food, beverages, and tobacco and the natural logarithm of real per capita total expenditure, 1993

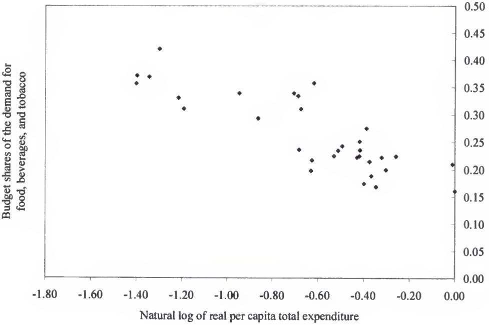

Figure 4.4. Scatter plot between budget share of the demand for food, beverages, and tobacco and the natural logarithm of real per capita total expenditure, 1996

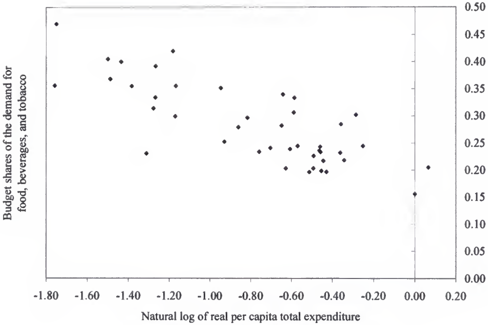

Figure 4.5. Scatter plot between budget share of the demand for food, beverages, and tobacco and the natural logarithm of real per capita total expenditure, 1999

CHAPTER 5
ANALYSIS OF POOLED DATA: THE BROAD CONSUMPTION GROUPS

This chapter examines the estimation method and provides empirical results for broad consumption groups obtained from pooling the cross-country and time-series data. The discussion is divided into three parts. The first part discusses the estimation method for pooling. The second part features the empirical results of the pooled data for nine broad consumption groups. In this case, the food, beverages, and tobacco category consists of food consumed at home, food consumed away from home, and beverages and tobacco. The third part features the empirical results of the pooled data for 10 broad consumption groups where food consumed at home and food consumed away from home are separated from beverages and tobacco to form two new categories (i.e., food category, and beverages and tobacco category). Results include parameter estimates and their corresponding demand elasticities. Parameters are estimated using the AR(1) corrected maximum likelihood procedure described in the following section.

Estimation Procedure for Pooling the Data

Pooling cross-country and time-series data has become a more common practice in demand analysis because pooling the data provides better information and permits estimates of demand system parameters for cross-country and time-series data, given that the character of the relationship under study does not change from time to time (Nuamah, 1986). Pooling cross-country and time-series data increases the sample size tremendously. In this chapter, instead of fitting the Florida PI model to each round of data individually, we pool the data such that the number of observations is 140 (compared to 21 observations in 1985, 23 observations in 1990 and 1993, 31 observations in 1996, and 42 observations in 1999). With additional price information gained from different years, the accuracy of the estimated parameters obtained by pooling the data will be improved and the estimates will be more desirable for researchers. In our study, we assume that if the error term of the food budget share of country *c* is positive and large in period *t*, it is likely that this country will have a positive error term for food in the next period (Theil et al., 1989). One way to impose this assumption is through an introduction of the AR(1) process with parameter τ.

AR(1) process

The AR(1) process is a process where disturbances are correlated. There are five phases in our study. Each phase represents data from five reference years (1985, 1990, 1993, 1996, and 1999). In the case when different time periods are involved, the general form of the Florida PI model can be written as

$$w_{ct} = f_{ct}(\theta) + \varepsilon_{ct}, \tag{5.1}$$

where subscript *t* indicates different reference years or phases ($t = 1, 2, 3, 4,$ or 5). In this case, the first phase ($t = 1$) represents reference year 1985. The second phase ($t = 2$) represents reference year 1990. The third phase ($t = 3$) represents reference year 1993. The fourth phase ($t = 4$) represents reference year 1996. Finally, the fifth phase ($t = 5$) represents reference year 1999. The term w_{ct} is the budget share of country *c* at time *t*, $f_{ct}(\theta)$ is a functional form of the Florida PI model at time *t*, and ε_{ct} is the disturbance term of country *c* at time *t*. Therefore, using Equation 5.1, the AR(1) process can be written as

$$\varepsilon_{ct} = \tau\varepsilon_{c,t-1} + v_{ct}, \tag{5.2}$$

where t-1 and t are two successive phases (i.e., phases 1 and 2, or phases 2 and 3, or phases 3 and 4, or phases 4 and 5); v_{ct} is independent, identically distributed $N(0, \Sigma_v)$; and $-1<\tau<1$.

Let h be the number of phases in which country c participates. After excluding outlying observations, 11 countries are participating in one phase. Eight countries are participating in two phases. Two countries are participating in four phases. Twenty-one countries are participating in five phases. It should be noted that no country participates in three phases because reference years 1990 and 1993 have the same number of countries. Let Ω_h be the covariance matrix of ε_c when country c participates in h phases, where h equals 1, 2, 4, or 5. Given the relationship in Equation 5.2, the form of Ω_h depends on the value of h or the number of phases in which countries participate. This can be defined as

$$\Omega_1 = \Sigma, \tag{5.3}$$

$$\Omega_2 = \begin{bmatrix} \Sigma & \tau\Sigma \\ \tau\Sigma & \Sigma \end{bmatrix}, \tag{5.4}$$

$$\Omega_4 = \begin{bmatrix} \Sigma & \tau\Sigma & \tau^2\Sigma & \tau^3\Sigma \\ \tau\Sigma & \Sigma & \tau\Sigma & \tau^2\Sigma \\ \tau^2\Sigma & \tau\Sigma & \Sigma & \tau\Sigma \\ \tau^3\Sigma & \tau^2\Sigma & \tau\Sigma & \Sigma \end{bmatrix}, \text{ and} \tag{5.5}$$

$$\Omega_5 = \begin{bmatrix} \Sigma & \tau\Sigma & \tau^2\Sigma & \tau^3\Sigma & \tau^4\Sigma \\ \tau\Sigma & \Sigma & \tau\Sigma & \tau^2\Sigma & \tau^3\Sigma \\ \tau^2\Sigma & \tau\Sigma & \Sigma & \tau\Sigma & \tau^2\Sigma \\ \tau^3\Sigma & \tau^2\Sigma & \tau\Sigma & \Sigma & \tau\Sigma \\ \tau^4\Sigma & \tau^3\Sigma & \tau^2\Sigma & \tau\Sigma & \Sigma \end{bmatrix}. \tag{5.6}$$

AR(1) corrected maximum likelihood estimation

With an additional parameter τ, log-likelihood function takes a new form. In this case, our AR(1) corrected maximum likelihood function takes the form

$$L = \text{constant} + \frac{1}{2}\sum_{h=1}^{5} N_h \log\left|\Omega_h^{-1}\right| - \frac{1}{2}\left[\sum_{c=1}^{11} \varepsilon_c^T \Omega_1^{-1} \varepsilon_c + \sum_{c=12}^{19} \varepsilon_c^T \Omega_2^{-1} \varepsilon_c\right]$$
$$-\frac{1}{2}\left[\sum_{c=20}^{21} \varepsilon_c^T \Omega_4^{-1} \varepsilon_c + \sum_{c=22}^{42} \varepsilon_c^T \Omega_5^{-1} \varepsilon_c\right], \tag{5.7}$$

where N_h is the number of countries that participate in h phases. By substituting Ω_h (h = 1, 2, 4, or 5) and $\Sigma = (1-\tau^2)^{-1}\Sigma_\nu$ into Equation 5.7, the log-likelihood under AR(1) can be written as

$$L = \text{constant} + \frac{1}{2}(n-1)N\log(1-\tau^2) + \frac{1}{2}N^{*}\log\left|\Sigma_\nu^{-1}\right|$$
$$-\frac{1}{2}\left[(1-\tau^2)\sum_{c=1}^{42} \varepsilon_{c1}^T \Sigma_\nu^{-1} \varepsilon_{c1} + \sum_{c=12}^{42} (\varepsilon_{c2} - \tau\varepsilon_{c1})^T \Sigma_\nu^{-1} (\varepsilon_{c2} - \tau\varepsilon_{c1})\right]$$
$$-\frac{1}{2}\left[\sum_{c=20}^{42} (\varepsilon_{c3} - \tau\varepsilon_{c2})^T \Sigma_\nu^{-1} (\varepsilon_{c3} - \tau\varepsilon_{c2}) + \sum_{c=20}^{42} (\varepsilon_{c4} - \tau\varepsilon_{c3})^T \Sigma_\nu^{-1} (\varepsilon_{c4} - \tau\varepsilon_{c3})\right]$$
$$-\frac{1}{2}\left[\sum_{c=22}^{42} (\varepsilon_{c5} - \tau\varepsilon_{c4})^T \Sigma_\nu^{-1} (\varepsilon_{c5} - \tau\varepsilon_{c4})\right], \tag{5.8}$$

where $N = N_1 + N_2 + N_3 + N_4 + N_5$, and $N^{*} = N_1 + 2N_2 + 3N_3 + 4N_4 + 5N_5$. The AR(1) corrected log-likelihood function should be maximized with respect to the three unknown parameters (θ, Σ_ν, and τ). The AR(1) corrected concentrated log-likelihood function can be obtained by maximizing the AR(1) corrected log-likelihood function in Equation 5.8 with respect to Σ_ν, given θ and τ. The solution of Σ_ν is expressed as a function of θ and τ. Let $R(\theta, \tau)$ be the solution for Σ_ν. Substituting $R(\theta, \tau)$ for Σ_ν in the AR(1) corrected log-likelihood function in Equation 5.8 gives the AR(1) corrected concentrated log-likelihood function. The AR(1) corrected concentrated log-likelihood function is defined as

$$L^* = \text{constant} + \frac{1}{2}(n-1)N\log(1-\tau^2) + \frac{1}{2}N^*\log\left|R(\theta,\tau)^{-1}\right|, \tag{5.9}$$

where θ is a vector of α, β, and ϕ, respectively, and

$$\begin{aligned} R(\theta,\tau) &= \left(\frac{1}{N^*}\right)\left[(1-\tau^2)\sum_{c=1}^{42}\varepsilon_{c1}\varepsilon_{c1}^T + \sum_{c=12}^{42}(\varepsilon_{c2}-\tau\varepsilon_{c1})(\varepsilon_{c2}-\tau\varepsilon_{c1})^T\right] \\ &+ \left(\frac{1}{N^*}\right)\left[\sum_{c=20}^{42}(\varepsilon_{c3}-\tau\varepsilon_{c2})(\varepsilon_{c3}-\tau\varepsilon_{c2})^T + \sum_{c=20}^{42}(\varepsilon_{c4}-\tau\varepsilon_{c3})(\varepsilon_{c4}-\tau\varepsilon_{c3})^T\right] \\ &+ \left(\frac{1}{N^*}\right)\left[\sum_{c=22}^{42}(\varepsilon_{c5}-\tau\varepsilon_{c4})(\varepsilon_{c5}-\tau\varepsilon_{c4})^T\right]. \end{aligned} \tag{5.10}$$

Defining $df_{ct}(\theta)/d\theta^T$ as the first-order derivative of the functional form of the Florida PI model at time t with respect to parameter θ (θ is a vector of α, β, and ϕ, see also Equations 4.8, 4.9, and 4.10), the first-order derivatives of the concentrated likelihood function with respect to θ and τ are as follows:

$$\begin{aligned} \frac{dL^*}{d\theta} &= (1-\tau^2)\sum_{c=1}^{42}\left[\frac{df_{c1}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\varepsilon_{c1} \\ &+ \sum_{c=12}^{42}\left[\frac{df_{c2}(\theta)}{d\theta^T} - \tau\frac{df_{c1}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}(\varepsilon_{c2}-\tau\varepsilon_{c1}) \\ &+ \sum_{c=20}^{42}\left[\frac{df_{c3}(\theta)}{d\theta^T} - \tau\frac{df_{c2}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}(\varepsilon_{c3}-\tau\varepsilon_{c2}) \\ &+ \sum_{c=20}^{42}\left[\frac{df_{c4}(\theta)}{d\theta^T} - \tau\frac{df_{c3}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}(\varepsilon_{c4}-\tau\varepsilon_{c3}) \\ &+ \sum_{c=22}^{42}\left[\frac{df_{c5}(\theta)}{d\theta^T} - \tau\frac{df_{c4}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}(\varepsilon_{c5}-\tau\varepsilon_{c4}), \end{aligned} \tag{5.11}$$

$$\begin{aligned} \frac{dL^*}{d\tau} &= \frac{-(n-1)N\tau}{1-\tau^2} + \tau\sum_{c=1}^{42}\varepsilon_{c1}^T R(\theta,\tau)^{-1}\varepsilon_{c1} + \sum_{c=12}^{42}\varepsilon_{c1}^T R(\theta,\tau)^{-1}(\varepsilon_{c2}-\tau\varepsilon_{c1}) \\ &+ \sum_{c=20}^{42}\varepsilon_{c2}^T R(\theta,\tau)^{-1}(\varepsilon_{c3}-\tau\varepsilon_{c2}) + \sum_{c=20}^{42}\varepsilon_{c3}^T R(\theta,\tau)^{-1}(\varepsilon_{c4}-\tau\varepsilon_{c3}) \end{aligned}$$

$$+\sum_{c=22}^{42}\varepsilon_{c4}^{T}R(\theta,\tau)^{-1}(\varepsilon_{c5}-\tau\varepsilon_{c4})\,. \tag{5.12}$$

Define H as the Hessian of the concentrated log-likelihood function with respect to θ and τ. Therefore, the matrix of the second-order derivative or the Hessian of the concentrated log-likelihood function with respect to θ and τ takes the form

$$H=\begin{bmatrix}\dfrac{d^2L^*}{d\theta d\theta^T} & \dfrac{d^2L^*}{d\theta d\tau}\\ \dfrac{d^2L^*}{d\theta d\tau} & \dfrac{d^2L^*}{d\tau^2}\end{bmatrix}. \tag{5.13}$$

The estimated asymptotic covariance matrix of the maximum likelihood estimators ($\hat{\theta}$ and $\hat{\tau}$) can be derived by taking the negative value of the inverse of the expectation of the Hessian matrix. That is, the estimated asymptotic covariance matrix of the maximum likelihood estimators is

$$-[E(H)]^{-1}=-\begin{bmatrix}E\left(\dfrac{d^2L^*}{d\theta d\theta^T}\right) & E\left(\dfrac{d^2L^*}{d\theta d\tau}\right)\\ E\left(\dfrac{d^2L^*}{d\theta d\tau}\right) & E\left(\dfrac{d^2L^*}{d\tau^2}\right)\end{bmatrix}^{-1}. \tag{5.14}$$

Recall that the error terms have zero expectation; therefore the expectation of the second-order derivatives of the concentrated log-likelihood function with respect to θ and τ or $E\left(d^2L^*/d\theta d\tau\right)$ equals zero. As such, the estimated asymptotic covariance matrix of the maximum likelihood estimators can be simplified as

$$-[E(H)]^{-1}=-\begin{bmatrix}E\left(\dfrac{d^2L^*}{d\theta d\theta^T}\right) & 0\\ 0 & E\left(\dfrac{d^2L^*}{d\tau^2}\right)\end{bmatrix}^{-1}, \tag{5.15}$$

where

$$
\begin{aligned}
E\left(\frac{d^2L^*}{d\theta d\theta^T}\right) = &-(1-\tau^2)\sum_{c=1}^{42}\left[\frac{df_{c1}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df_{c1}(\theta)}{d\theta^T}\right] \\
&-\sum_{c=12}^{42}\left[\frac{df_{c2}(\theta)}{d\theta^T}-\tau\frac{df_{c1}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df_{c2}(\theta)}{d\theta^T}-\tau\frac{df_{c1}(\theta)}{d\theta^T}\right] \\
&-\sum_{c=20}^{42}\left[\frac{df_{c3}(\theta)}{d\theta^T}-\tau\frac{df_{c2}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df_{c3}(\theta)}{d\theta^T}-\tau\frac{df_{c2}(\theta)}{d\theta^T}\right] \\
&-\sum_{c=20}^{42}\left[\frac{df_{c4}(\theta)}{d\theta^T}-\tau\frac{df_{c3}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df_{c4}(\theta)}{d\theta^T}-\tau\frac{df_{c3}(\theta)}{d\theta^T}\right] \\
&-\sum_{c=22}^{42}\left[\frac{df_{c5}(\theta)}{d\theta^T}-\tau\frac{df_{c4}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df_{c5}(\theta)}{d\theta^T}-\tau\frac{df_{c4}(\theta)}{d\theta^T}\right], \text{ and} \qquad (5.16)
\end{aligned}
$$

$$
E\left(\frac{d^2L^*}{d\tau^2}\right) = -\left(\frac{(n-1)N(1+\tau^2)}{(1-\tau^2)^2}\right). \qquad (5.17)
$$

The asymptotic standard errors of the maximum likelihood estimators are simply the square root of the diagonal elements of Equation 5.15.

AR(1) Corrected Maximum Likelihood Estimates for Broad Consumption Groups: Food with Beverages and Tobacco

Table 5.1 illustrates the pooled estimates for nine broad consumption groups (i.e., food consumed at home and food consumed away from home combined with beverages and tobacco). Real incomes per capita of the pooled data are converted to 1999 dollars using consumer price index. This can be done by dividing real income per capita by the ratio of the consumer price index for all urban consumers from each individual year and the 1999 consumer price index for all urban consumers. According to the United States Department of Labor, the ratio of the 1985 consumer price index for all urban consumers and the 1999 consumer price index for all urban consumers is 0.65. As a result, we divided real income per capita of broad consumption groups in 1985 by 0.65 to convert the 1985 dollars into the 1999 dollars. Similarly, the ratios of the 1990, 1993, 1996, and 1999 consumer price index for all urban consumers and the 1999 consumer price index for all urban consumers are 0.78, 0.87, 0.94, and 1.00, respectively. As a result, we divided real incomes per capita of broad consumption groups in 1990, 1993, 1996, and 1999 by 0.78, 0.87, 0.94, and 1.00, respectively, to convert the 1990, 1993, 1996, and 1999 dollars into the 1999 dollars. We normalize such that the real income per capita of the United States in 1999 equals one.

In most cases, pooled estimates fall within the values of the estimates obtained from the individual phases (see Chapter 4). For instance, the β coefficient of the demand for food, beverages, and tobacco (obtained by fitting the Florida PI model to each round of data individually) ranges from -0.189 (statistically significant at the 5% level) in 1985 to -0.105 (statistically significant at the 5% level) in 1996, while the β coefficient of the demand for food, beverages, and tobacco (obtained by fitting the Florida PI model to the pooled data) equals -0.115 (statistically significant at the 5% level). Similarly, the β coefficient of the demand for medical care (obtained by fitting the Florida PI model to each round of data individually) ranges from 0.019 (not statistically significant at the 5% level) in 1999 to 0.113 (statistically significant at the 5% level) in 1993, while the β coefficient of the demand for medical care (obtained by fitting the Florida PI model to pooled data) equals 0.037 (statistically significant at the 5% level). Overall, the β coefficients are mostly statistically significant (at the 5% level) when data are pooled, except for clothing and footwear and gross rent, fuel, and power. In most cases, asymptotic standard errors are smaller for the pooled estimates compared to those reported from individual year. For instance, the β coefficient of demand for food, beverages, and tobacco (in 1985) equals -0.189 with an asymptotic standard error of

0.022, while the β coefficient of demand for the same category when data are pooled equals -0.115 with an asymptotic standard error of 0.008.

Recall that our income elasticities are evaluated at geometric mean prices and the sign of the β coefficient determines whether the category grouping is a necessity, a luxury, or has unitary elasticity. Category groupings with negative β coefficients are defined as necessities, whereas category groupings with positive β coefficients are defined as luxuries. Zero β coefficients indicate unitary income elasticities. The results show that β coefficients of demand for food, beverages, and tobacco; clothing and footwear; and gross rent, fuel, and power categories are negative, indicating that these categories are necessities. The β coefficient of demand for food, beverages, and tobacco is statistically significant at the 5% level and equals -0.115. On the other hand, β coefficients of demand for clothing and footwear and gross rent, fuel, and power are not statistically significant at the 5% level. The β coefficient of demand for clothing and footwear equals -0.003, while the β coefficient of demand for gross rent, fuel, and power equals -0.007. The rest of the consumption categories are luxuries with positive β coefficients. All β coefficients for the rest of the consumption categories are statistically significant at the 5% level. The β coefficient of demand for house furnishings and operations equals 0.014. The β coefficient of demand for medical care equals 0.037. The β coefficient of demand for transport and communications equals 0.012. The β coefficient of demand for recreation equals 0.022. The β coefficient of demand for education equals 0.014. Finally, the β coefficient of demand for other expenditures equals 0.026. The autoregressive parameter equals 0.410 and is statistically significant at the 5% level. These pooled estimates are used in the following subsections to obtain demand elasticities for the pooled data when food is combined with beverages and tobacco.

Income and Price Sensitivity

This section covers income and price sensitivities of the Florida PI model. For simplicity, both income and own-price elasticity measures are defined at the observed real income per capita of country *c* (Q_c) and at the geometric mean prices ($\bar{p}_i$ for $i = 1, \ldots, n$). This means that the budget share of good *i* for country *c* will be represented by $\tilde{w}_{ic}$. Clearly, the most commonly reported income and price sensitivities are income and price elasticities, respectively. Furthermore, price elasticities are denoted as own-price and cross-price elasticities. The difference is the own-price elasticity measures the percentage change in quantity demanded of good *i* for a 1% change in the price of good *i*, while the cross-price elasticities measure the responsiveness of the quantity demanded of good *i* to changes in price of good *j* ($i \neq j$). In our study, only own-price elasticity is discussed. Mathematical expressions and the empirical results for both the income elasticity of demand and the own-price elasticity obtained from the Florida PI model are discussed as follows.

Income Elasticity of Demand

The income elasticity of demand for good *i* indicates the percentage change in the quantity demanded for good *i* when real income changes by 1%. Recall from Equation 3.49 that by differentiating $d(\log q_i)$ by $d(\log Q)$, income elasticity of demand for the Florida PI model can be expressed as θ_i / w_i. Note that θ_i is the marginal share of good *i* and w_i is the budget share of good *i*. In practice, we evaluate the budget share of good *i* in country c at the observed real income per capita of country c (Q_c) and at the geometric mean prices ($\bar{p}_i$ for $i = 1, \ldots, n$). That is, $\tilde{w}_{ic} = \alpha_i + \beta_i \log Q_c$. Therefore, the income elasticity of demand for good i in country c is

$$\eta_{ic} = \frac{\theta_i}{\tilde{w}_{ic}} = 1 + \frac{\beta_i}{\tilde{w}_{ic}}. \tag{5.18}$$

Table 5.2 reports the income elasticities of demand for broad consumption groups at geometric mean prices for the pooled data (food combined with beverages and tobacco). Countries are sorted by descending order of percentage shares of their total real income per capita with respect to that of the United States in 1999. With a larger number of observations (140 observations when data are pooled), there is no presence of inferior goods. This finding coincides with the theory that no inferior goods exist in the Florida PI model. However, when we fit the Florida PI model to each round of data individually, the food, beverages, and tobacco category is an inferior good for the United States in 1985 and 1990, and for Luxembourg in 1990 (Appendix B).

Income elasticities increase with decreasing real income per capita. Three broad consumption categories (food, beverages, and tobacco; clothing and footwear; and gross rent, fuel, and power) are necessities, with income elasticities less than one. The food, beverages, and tobacco category is the most income inelastic group with the smallest income elasticities. Income elasticities of demand for food, beverages, and tobacco vary greatly from 0.40 for Luxembourg to 0.73 for Ukraine in 1999. Unlike the food, beverages, and tobacco category, income elasticities of demand for clothing and footwear and for gross rent, fuel, and power do not vary greatly among countries. For instance, income elasticities of demand for clothing and footwear and for gross rent, fuel, and power are approximately 0.96 for all countries in all years.

Income elasticities of demand for the rest of the broad consumption groups are greater than one, suggesting that they are luxuries. Medical care is the most luxurious category, with income elasticities ranging widely from 1.47 for Luxembourg to 10.84 for Ukraine in 1999. The next most luxurious category is other expenditures, followed by recreation, house furnishings and operations, and education. Income elasticities of demand for other expenditures range from 1.30 for Luxembourg to 1.76 for Ukraine in 1999. Recreation has income elasticities ranging from 1.24 for Luxembourg to 1.49 for Ukraine in 1999, whereas income elasticities of demand for house furnishings and operations range from 1.19 for Luxembourg to 1.31 for Ukraine in 1999. Income elasticities of demand for education vary slightly from 1.16 for Luxembourg to 1.23 for Ukraine in 1999. Transport and communications is the least luxurious category, with income elasticities ranging slightly from 1.08 for Luxembourg to 1.09 for Ukraine in 1999.

Figure 5.1 shows the comparison of average income elasticities of demand for broad consumption groups obtained from the pooled estimates over time. The comparison shows that average income elasticities of demands for clothing and footwear; gross rent, fuel, and power; house furnishings and operations; transport and communications; and education are stable over time. However, the finding shows that demands for food, beverages, and tobacco; recreation; medical care; and other expenditures are less responsive to income changes before 1993 but are more responsive to income changes after 1993. Specifically, average income elasticities of demands for food, beverages, and tobacco; recreation; and other expenditures decrease slightly between 1985 and 1993 but increase slightly between 1993 and 1999. Finally, average income elasticities of demand for medical care decrease greatly from 1985 to 1993 but increase greatly from 1993 to 1999.

Own-Price Elasticity of Demand

The own-price elasticity measure is defined as the percentage change in the quantity demanded of good *i* for a 1% change in its price. Because the analysis of broad consumption groups were based on total income and group price, the estimated own-price elasticities in this stage show percentage change of demand for category *i* (a total of nine consumption categories) for a one percentage change of its group price, given total expenditure. In our study, we present three types of own-price elasticities. They are the Frisch own-price elasticity, the Slutsky own-price elasticity, and the Cournot own-price elasticity.

Frisch own-price elasticity

The Frisch own-price elasticity is defined as the own-price elasticity when there is an income compensation that keeps the marginal utility of income constant. This is simply elasticity with respect to the Frisch-deflated price of good *i*. The Frisch own-price elasticity for the Florida PI model can be expressed as

$$F_{PI} = \frac{\phi\theta_i}{\widetilde{w}_{ic}} = \frac{\phi(\widetilde{w}_{ic} + \beta_i)}{\widetilde{w}_{ic}}, \tag{5.19}$$

where $\widetilde{w}_{ic} = \alpha_i + \beta_i \log Q_c$ and ϕ is the income flexibility estimated from the Florida PI model. Recall that the matrix $[\theta_{ij}]$ is a diagonal matrix under the Florida PI model. This means that the term θ_{ii} equals θ_i.

Slutsky own-price elasticity

The Slutsky own-price elasticity measures the change in demand of good *i* when its price changes while real income remains unchanged. It can be derived by differentiating

$d(\log q_i)$ in Equation 3.49 by $d(\log p_i)$ and holding $d(\log Q)$ constant. The Slutsky own-price elasticity for the Florida PI model is

$$S_{PI} = \frac{\phi\theta_i(1-\theta_i)}{\widetilde{w}_{ic}} = \frac{\phi(\widetilde{w}_{ic}+\beta_i)(1-\widetilde{w}_{ic}-\beta_i)}{\widetilde{w}_{ic}}, \tag{5.20}$$

where $\widetilde{w}_{ic} = \alpha_i + \beta_i \log Q_c$ and ϕ is the income flexibility estimated from the Florida PI model.

Cournot own-price elasticity

The Cournot own-price elasticity measures the change in demand of good *i* when its price changes while nominal income remains unchanged but real income changes. It can be derived by differentiating $d(\log q_i)$ in Equation 3.49 by $d(\log p_i)$ and holding $d(\log E)$ constant, giving the expression for the Cournot own-price elasticity for the Florida PI model as

$$C_{PI} = \frac{\phi\theta_i}{\widetilde{w}_{ic}}(1-\theta_i)-\theta_i, \tag{5.21}$$

where $\widetilde{w}_{ic} = \alpha_i + \beta_i \log Q_c$, ϕ is the income flexibility estimated from the Florida PI model, and θ_i is the marginal share of good *i*. Note that the first term of the Cournot own-price elasticity is simply the Slutsky own-price elasticity. As a result, the Cournot own-price elasticity of the Florida PI model is the difference between its Slutsky own-price elasticity and the marginal share of good *i*.

Tables 5.3 to 5.5 report the Frisch, the Slutsky, and the Cournot own-price elasticities of demand for broad consumption groups for the pooled data (food combined with beverages and tobacco). Countries were sorted by descending order of percentage shares of their real income per capita with respect to that of the United States in 1999.

Most of the absolute values of the own-price elasticities have increased when we move from countries with higher real income per capita to countries with lower real income per capita. The Slutsky own-price elasticities have the lowest absolute values when compared to the corresponding absolute values of both the Frisch and Cournot own-price elasticities. Medical care has the largest absolute value of the own-price elasticities, with values that vary widely from countries with higher levels of real income per capita to countries with lower levels of real income per capita. For instance, the Frisch own-price elasticities of demand for medical care range from -1.15 for Luxembourg to -8.49 for Ukraine in 1999. The Cournot own-price elasticities of demand for medical care range from -1.13 for Luxembourg to -8.19 for Ukraine in 1999. The Slutsky own-price elasticities of demand for medical care range from -1.02 for Luxembourg to -8.15 for Ukraine in 1999.

The next most own-price elastic consumption category is other expenditures. The Frisch own-price elasticities of demand for other expenditures range from -1.02 for Luxembourg to -1.38 for Ukraine in 1999. The Cournot own-price elasticities of demand for the same category range from -1.02 for Luxembourg to -1.36 for Ukraine in 1999. However, the Slutsky own-price elasticities of demand for other expenditures show that the other expenditures category is own-price inelastic as we move from Luxembourg to Israel in 1999 but are own-price elastic as we move from Slovenia to Ukraine in 1999. In addition, demand for other expenditures has unitary Slutsky own-price elasticities as we move from New Zealand in 1985 to Slovenia in 1996.

The most own-price inelastic consumption category is food, beverages, and tobacco because it has the smallest absolute value of the own-price elasticities. The Slutsky own-price elasticities of demand for food, beverages, and tobacco vary from -0.29 for Luxembourg to -0.40 for Ukraine in 1999. The Frisch own-price elasticities of the demand for food, beverages, and tobacco are between -0.32 for Luxembourg and -0.57 for Ukraine in 1999, while the Cournot own-price elasticities of the demand for food, beverages, and tobacco range from -0.37 for Luxembourg to -0.71 for Ukraine in 1999.

Clothing and footwear; gross rent, fuel, and power; and transport and communication are own-price inelastic. Own-price elasticities for these three consumption categories do not vary greatly across countries. For instance, the Slutsky own-price elasticities of demand for clothing and footwear are between -0.71 for Luxembourg and -0.72 for Ukraine in 1999. Similarly, the Cournot own-price elasticities of demand for clothing and footwear are between -0.76 for Luxembourg and -0.77 for Ukraine in 1999, while the Frisch own-price elasticities are -0.75 for all countries in all years. Gross rent, fuel, and power has Slutsky and Cournot own-price elasticities equaling -0.62 and -0.80, respectively, for all countries in all years. The Frisch own-price elasticities of demand for gross rent, fuel, and power are between -0.75 for Luxembourg and -0.76 for Ukraine in 1999. In addition, transport and communications has Frisch and Cournot own-price elasticities equal -0.84 and -0.87, respectively, for all countries in all years. The Slutsky own-price elasticities of demand for transport and communications are between -0.71 for Luxembourg and -0.74 for Ukraine in 1999. Education is also own-price inelastic. The Slutsky own-price elasticities of demand for education range from -0.81 for Luxembourg to -0.89 for Ukraine in 1999. The Frisch own-price elasticities of demand for education range from -0.91 for Luxembourg to -0.97 for

Ukraine in 1999, while the Cournot own-price elasticities range from -0.92 for Luxembourg to -0.97 for Ukraine in 1999.

The demand for some of the broad consumption categories changes from the own-price inelastic to own-price elastic as we move from more affluent to less affluent countries. For instance, Frisch and Cournot own-price elasticities show that demand for house furnishings and operations is own-price elastic among the three countries with the lowest level of real income per capita (e.g., the Russian Federation in 1999, Romania in 1999, and Ukraine in 1999) but is own-price inelastic for the rest of the sample. In addition to house furnishings and operations, recreation also changes from the own-price inelastic to the own-price elastic category. The Cournot own-price elasticities suggest that demand for recreation has unitary Cournot own-price elasticities as we move from Canada in 1996 to France in 1999, and becomes own-price elastic as we move from Belgium in 1999 to Ukraine in 1999.

Figures 5.2 to 5.4 illustrate comparisons of average own-price elasticities of demand for broad consumption groups obtained from pooled estimates over time. Overall, comparisons of the own-price elasticities show that absolute values of the three own-price elasticities of demands for clothing and footwear; gross rent, fuel, and power; and transport and communications are stable over time. A comparison of the Cournot own-price elasticities over time show that demand for education is not sensitive to price changes between 1990 and 1996. However, in most cases, our finding shows that demands for the rest of the consumption groups (food, beverages, and tobacco; house furnishings and operations; medical care; recreation; education; and other expenditures) are less responsive to own-price changes between 1985 and 1993 but are more responsive to own-price changes between 1993 and 1999. Essentially, the average own-price elasticities of demands for medical care (in absolute values) decrease greatly between 1985 and 1993 but increase greatly between 1993 and 1999.

AR(1) Corrected Maximum Likelihood Estimates for Broad Consumption Groups: Food Separate from Beverages and Tobacco

Table 5.6 reports parameter estimates for the pooled data when food (i.e., food consumed at home and food consumed away from home) is separated from beverages and tobacco. The main differences between the estimates obtained in Tables 5.1 and 5.6 lie within the β and α coefficients of demand for food and demand for beverages and tobacco. Recall that category groupings with negative β coefficients are defined as necessities, whereas category groupings with positive β coefficients are defined as luxuries. Zero β coefficients indicate unitary income elasticities. The results show that β coefficients of demand for food alone; beverages and tobacco alone; clothing and footwear; and gross rent, fuel, and power categories are negative, indicating that these categories are necessities.

Essentially, when food is separated from beverages and tobacco, the β coefficient of demand for food alone is -0.104 and the β coefficient of the demand for beverages and tobacco alone is -0.013. Both are statistically significant at the 5% level. Although β coefficients of demand for the clothing and footwear category and the gross rent, fuel, and power category are negative, they are not statistically significant at the 5% level. The values are comparable to those reported in Table 5.1. In fact, the β coefficients of demand for clothing and footwear are the same (-0.003). The β coefficient of demand for gross rent, fuel, and power is -0.006 when food is separated from beverages and tobacco, whereas the β coefficient of the same category is -0.007 when food is combined with beverages and tobacco.

The β coefficients for the rest of the consumption categories are statistically significant at the 5% level and are positive, suggesting that they are luxury goods. In addition, the values are the same as those reported in Table 5.1, except for education. For instance, the β coefficient of demand for house furnishings and operations equals 0.014. The β coefficient of demand for medical care equals 0.037. The β coefficient of demand for transport and communications equals 0.012. The β coefficient of demand for recreation equals 0.022. The β coefficient of demand for other expenditures equals 0.026. Finally, the β coefficient for education is 0.015 when food is separated from beverages and tobacco but is 0.014 when food is separated from beverages and tobacco. The autoregressive parameter is statistically significant at the 5% level when food is separated from beverages and tobacco. The value changes slightly from 0.410 for the combined case to 0.396 for the disaggregated case.

Income Elasticity of Demand

Income elasticities are obtained by using parameter estimates in Table 5.6. Table 5.7 reports income elasticities at the geometric mean prices of the pooled data when food is separated from beverages and tobacco. Countries are sorted by descending order of percentage shares of their total real income per capita with respect to that of the United States in 1999. Food is the most income inelastic category, with income elasticities ranging from 0.30 for Luxembourg to 0.71 for Ukraine in 1999. Because food consists of food consumed at home and food consumed away from home, income elasticities of demand for food alone is still large. Beverages and tobacco is also income inelastic.

Income elasticities of demand for beverages and tobacco alone range from 0.69 for Luxembourg to 0.81 for Ukraine in 1999. Income elasticities of demand for the rest of the broad consumption categories are approximately the same as those reported in Table 5.2. For instance, income elasticities of demand for clothing and footwear and for gross rent, fuel, and power are approximately 0.95 and 0.97, respectively, for all countries in all years.

Income elasticities of demand for the rest of the broad consumption groups are greater than one, suggesting that they are luxuries. Medical care is the most luxurious category, with income elasticities ranging widely from 1.47 for Luxembourg to 10.12 for Ukraine in 1999. The next most luxurious category is other expenditures, followed by recreation, house furnishings and operations, and education. Income elasticities of demand for other expenditures range from 1.30 for Luxembourg to 1.77 for Ukraine in 1999. Recreation has income elasticities ranging from 1.25 for Luxembourg to 1.49 for Ukraine in 1999, whereas income elasticities of demand for house furnishings and operations range from 1.19 for Luxembourg to 1.31 for Ukraine in 1999. Income elasticities of demand for education vary slightly from 1.17 for Luxembourg to 1.26 for Ukraine in 1999. Transport and communications is the least luxurious category, with income elasticities ranging slightly from 1.08 for Luxembourg to 1.09 for Ukraine in 1999. Overall, income elasticities increase with decreasing real income per capita. In addition, income elasticities of demand for food combined with beverages and tobacco fall within the values of income elasticities of demand for food alone and for beverages and tobacco alone.

Own-Price Elasticity of Demand

Tables 5.8 to 5.10 report the Frisch, the Slutsky, and the Cournot own-price elasticities of demand for broad consumption groups for the pooled data when food is separated from beverages and tobacco. As before, countries are sorted by descending order of percentage shares of their real income per capita with respect to that of the United States in 1999. The findings suggest that demand for food alone and demand for beverages and tobacco alone is still own-price inelastic. Food is the most own-price inelastic category. The Frisch own-price elasticities of demand for food alone range from -0.23 for Luxembourg to -0.55 for Ukraine in 1999. The Slutsky own-price elasticities of demand for food alone are between -0.22 for Luxembourg and -0.41 for Ukraine in 1999, while the Cournot own-price elasticities of the demand for food alone range from -0.26 for Luxembourg to -0.67 for Ukraine in 1999. In the case of demand for beverages and tobacco alone, the Frisch own-price elasticities of demand for beverages and tobacco are between -0.54 for Luxembourg and -0.63 for Ukraine in 1999. Slutsky own-price elasticities of demand for beverages and tobacco are between -0.52 for Luxembourg and -0.59 for Ukraine in 1999. Finally, the Cournot own-price elasticities of demand for beverages and tobacco are between -0.55 for Luxembourg and -0.65 for Ukraine in 1999. Own-price elasticities for the rest of the consumption categories are approximately the same as those reported in Tables 5.3, 5.4, and 5.5. For instance, the Frisch own-price elasticities of demand for medical care range from -1.14 for Luxembourg to -7.87 for Ukraine in 1999. The Cournot own-price elasticities of demand for medical care range from -1.13 for Luxembourg to -7.59 for Ukraine in 1999. The Slutsky own-price elasticities of demand for medical care range from -1.01 for Luxembourg to -7.55 for Ukraine in 1999.

The next most own-price elastic consumption category is other expenditures. The Frisch own-price elasticities of demand for other expenditures range from -1.01 for Luxembourg to -1.37 for Ukraine in 1999. The Cournot own-price elasticities of demand for the same category range from -1.01 for Luxembourg to -1.35 for Ukraine in 1999. However, the Slutsky own-price elasticities of demand for other expenditures show that the other expenditures category is own-price inelastic as we move from Luxembourg to Austria in 1985 but are own-price elastic as we move from Czech Republic in 1996 to Ukraine in 1999. In addition, demand for other expenditures has unitary Slutsky own-price elasticities for Slovenia in 1996 and 1999.

Clothing and footwear; gross rent, fuel, and power; and transport and communication are own-price inelastic. Own-price elasticities for these three consumption categories do not vary greatly across countries. For instance, the Frisch, Cournot, and Slutsky own-price elasticities of demand for clothing and footwear are -0.74, -0.76, and -0.70, respectively, for all countries in all years. Similarly, gross rent, fuel, and power has Frisch, Cournot, and Slutsky own-price elasticities equaling -0.75, -0.80, and -0.62, respectively, for all countries in all years. In addition, transport and communications has Cournot own-price elasticities equaling -0.87 for all countries in all years. The Slutsky own-price elasticities of demand for transport and communications are between -0.70 for Luxembourg and -0.73 for Ukraine in 1999. The Frisch own-price elasticities of demand for transport and communications are between -0.84 for Luxembourg and -0.85 for Ukraine in 1999. Education is also own-price inelastic. The Slutsky own-price elasticities of demand for education range from -0.81 for Luxembourg to -0.90 for Ukraine in 1999. The Frisch own-price elasticities of demand for education range from -0.91 for Luxembourg to -0.98 for Ukraine in 1999, while the Cournot own-price elasticities range from -0.92 for Luxembourg to -0.98 for Ukraine in 1999.

The demand for some of the broad consumption categories changes from own-price inelastic to own-price elastic as we move from more affluent to less affluent countries. For instance, Frisch and Cournot own-price elasticities show that demand for house furnishings and operations has unitary own-price elasticities for the Russian Federation and Romania in 1999 and is own-price elastic for Ukraine in 1999. However, demand for the house furnishings and operations category is own-price inelastic for the rest of the countries. In addition to house furnishings and operations, recreation also changes from the own-price inelastic to the own-price elastic category. The Cournot own-price elasticities suggest that demand for recreation has unitary Cournot own-price elasticities as we move from Italy in 1990 to Sweden in 1996 and becomes own-price elastic as we move from Sweden in 1993 to Ukraine in 1999. Overall, absolute values of the own-price elasticities increase with decreasing real income per capita. In addition, absolute values of the own-price elasticities of demand for food combined with beverages and tobacco fall within the values of own-price elasticities of demand for food alone and for beverages and tobacco alone.

Table 5.1. Pooled estimates for nine broad consumption groups

Parameters	Consumption categories		
Income flexibility (ϕ)		-0.783*	(0.027)
Beta (β)	Food, beverages, and tobacco	-0.115*	(0.008)
	Clothing and footwear	-0.003	(0.003)
	Gross rent, fuel, and power	-0.007	(0.009)
	House furnishings and operations	0.014*	(0.002)
	Medical care	0.037*	(0.007)
	Transport and communications	0.012*	(0.004)
	Recreation	0.022*	(0.003)
	Education	0.014*	(0.006)
	Other expenditures	0.026*	(0.004)
Alpha (α)	Food, beverages, and tobacco	0.200*	(0.006)
	Clothing and footwear	0.061*	(0.002)
	Gross rent, fuel, and power	0.178*	(0.007)
	House furnishings and operations	0.075*	(0.002)
	Medical care	0.076*	(0.006)
	Transport and communications	0.149*	(0.004)
	Recreation	0.088*	(0.003)
	Education	0.088*	(0.004)
	Other expenditures	0.085*	(0.004)
Autoregressive (τ)		0.410*	(0.023)

Note: Asymptotic standard errors of the associated parameters are shown in parentheses and * denotes statistically significant at the 5% level.

Table 5.2. Income elasticities for nine broad consumption groups, pooled data

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	0.40	0.96	0.96	1.19	1.47	1.08	1.24	1.16	1.30
Luxembourg	1993	0.41	0.96	0.96	1.19	1.47	1.08	1.25	1.16	1.30
United States	1996	0.41	0.96	0.96	1.19	1.47	1.08	1.25	1.16	1.30
Luxembourg	1996	0.41	0.96	0.96	1.19	1.47	1.08	1.25	1.16	1.30
United States	1993	0.42	0.96	0.96	1.19	1.48	1.08	1.25	1.16	1.30
United States	1999	0.43	0.96	0.96	1.19	1.48	1.08	1.25	1.16	1.30
Switzerland	1993	0.48	0.96	0.96	1.20	1.53	1.08	1.26	1.16	1.32
United States	1990	0.48	0.96	0.96	1.20	1.53	1.08	1.26	1.17	1.32
Switzerland	1996	0.49	0.96	0.96	1.20	1.54	1.08	1.26	1.17	1.32
United States	1985	0.49	0.96	0.96	1.20	1.54	1.08	1.26	1.17	1.33
Japan	1996	0.50	0.96	0.96	1.20	1.55	1.08	1.27	1.17	1.33
Switzerland	1999	0.50	0.96	0.96	1.20	1.55	1.08	1.27	1.17	1.33
Belgium	1996	0.50	0.96	0.96	1.20	1.55	1.08	1.27	1.17	1.33
Belgium	1993	0.50	0.96	0.96	1.20	1.56	1.08	1.27	1.17	1.33
Japan	1993	0.51	0.96	0.96	1.20	1.56	1.08	1.27	1.17	1.33
Cyprus	1999	0.51	0.96	0.96	1.20	1.56	1.08	1.27	1.17	1.33
Luxembourg	1990	0.51	0.96	0.96	1.20	1.56	1.08	1.27	1.17	1.33
Germany	1996	0.51	0.96	0.96	1.20	1.56	1.08	1.27	1.17	1.33
Canada	1996	0.51	0.96	0.96	1.20	1.57	1.08	1.27	1.17	1.34
Germany	1993	0.51	0.96	0.96	1.20	1.57	1.08	1.27	1.17	1.34
Canada	1993	0.51	0.96	0.96	1.20	1.57	1.08	1.27	1.17	1.34
Australia	1996	0.51	0.96	0.96	1.20	1.57	1.08	1.27	1.17	1.34
France	1993	0.51	0.96	0.96	1.20	1.57	1.08	1.27	1.17	1.34
Iceland	1996	0.52	0.96	0.96	1.20	1.58	1.08	1.27	1.17	1.34
Switzerland	1990	0.52	0.96	0.96	1.20	1.58	1.08	1.27	1.17	1.34

Note: Countries were sorted by real income per capita.

Table 5.2. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	0.52	0.96	0.96	1.20	1.58	1.08	1.27	1.17	1.34
Netherlands	1996	0.52	0.96	0.96	1.20	1.58	1.08	1.27	1.17	1.34
Italy	1993	0.52	0.96	0.96	1.20	1.58	1.08	1.27	1.17	1.34
Netherlands	1993	0.52	0.96	0.96	1.21	1.58	1.08	1.27	1.17	1.34
Austria	1993	0.52	0.96	0.96	1.21	1.58	1.08	1.27	1.17	1.34
Iceland	1999	0.52	0.96	0.96	1.21	1.58	1.08	1.27	1.17	1.34
Austria	1996	0.52	0.96	0.96	1.21	1.59	1.08	1.27	1.17	1.34
Italy	1999	0.52	0.96	0.96	1.21	1.59	1.08	1.27	1.17	1.34
Italy	1996	0.52	0.96	0.96	1.21	1.59	1.08	1.27	1.17	1.34
Denmark	1996	0.52	0.96	0.96	1.21	1.59	1.08	1.27	1.17	1.34
France	1996	0.53	0.96	0.96	1.21	1.59	1.08	1.27	1.17	1.34
Australia	1993	0.53	0.96	0.96	1.21	1.59	1.08	1.28	1.17	1.35
Italy	1990	0.54	0.96	0.96	1.21	1.61	1.08	1.28	1.17	1.35
Iceland	1993	0.54	0.96	0.96	1.21	1.61	1.08	1.28	1.17	1.35
Germany	1990	0.54	0.96	0.96	1.21	1.61	1.08	1.28	1.17	1.35
France	1990	0.54	0.96	0.96	1.21	1.61	1.08	1.28	1.17	1.35
Canada	1999	0.54	0.96	0.96	1.21	1.61	1.08	1.28	1.17	1.35
Canada	1985	0.54	0.96	0.96	1.21	1.61	1.08	1.28	1.17	1.35
United Kingdom	1996	0.54	0.96	0.96	1.21	1.61	1.08	1.28	1.17	1.35
Denmark	1999	0.54	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35
United Kingdom	1993	0.54	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35
Denmark	1993	0.54	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35
Germany	1999	0.54	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35
Australia	1999	0.55	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35
Norway	1996	0.55	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35

Note: Countries were sorted by real income per capita.

Table 5.2. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	0.55	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35
Norway	1999	0.55	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.35
Canada	1990	0.55	0.96	0.96	1.21	1.62	1.08	1.28	1.17	1.36
New Zealand	1996	0.55	0.96	0.96	1.21	1.63	1.08	1.28	1.17	1.36
Belgium	1990	0.55	0.96	0.96	1.21	1.63	1.08	1.28	1.17	1.36
Norway	1993	0.55	0.96	0.96	1.21	1.63	1.08	1.28	1.17	1.36
France	1999	0.55	0.96	0.96	1.21	1.63	1.08	1.28	1.17	1.36
Belgium	1999	0.55	0.96	0.96	1.21	1.63	1.08	1.28	1.17	1.36
Japan	1990	0.55	0.96	0.96	1.21	1.64	1.08	1.28	1.17	1.36
Netherlands	1999	0.56	0.96	0.96	1.21	1.64	1.08	1.29	1.17	1.36
Austria	1990	0.56	0.96	0.96	1.21	1.65	1.08	1.29	1.17	1.36
New Zealand	1993	0.56	0.96	0.96	1.21	1.65	1.08	1.29	1.17	1.36
Iceland	1990	0.56	0.96	0.96	1.21	1.65	1.08	1.29	1.17	1.36
United Kingdom	1990	0.56	0.96	0.96	1.21	1.65	1.08	1.29	1.18	1.36
Denmark	1990	0.56	0.96	0.96	1.21	1.66	1.08	1.29	1.18	1.37
Netherlands	1990	0.56	0.96	0.96	1.21	1.66	1.08	1.29	1.18	1.37
Luxembourg	1985	0.57	0.96	0.96	1.21	1.66	1.08	1.29	1.18	1.37
Spain	1996	0.57	0.96	0.96	1.21	1.66	1.08	1.29	1.18	1.37
Japan	1999	0.57	0.96	0.96	1.21	1.67	1.08	1.29	1.18	1.37
Israel	1996	0.57	0.96	0.96	1.21	1.67	1.08	1.29	1.18	1.37
Australia	1990	0.57	0.96	0.96	1.21	1.67	1.08	1.29	1.18	1.37
Sweden	1996	0.57	0.96	0.96	1.21	1.67	1.08	1.29	1.18	1.37
Sweden	1993	0.57	0.96	0.96	1.22	1.67	1.08	1.29	1.18	1.37
Spain	1999	0.57	0.96	0.96	1.22	1.67	1.08	1.29	1.18	1.37
Ireland	1999	0.57	0.96	0.96	1.22	1.68	1.08	1.29	1.18	1.37

Note: Countries were sorted by real income per capita.

Table 5.2. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	0.57	0.96	0.96	1.22	1.68	1.08	1.29	1.18	1.37
Sweden	1990	0.57	0.96	0.96	1.22	1.69	1.08	1.29	1.18	1.37
France	1985	0.58	0.96	0.96	1.22	1.69	1.08	1.29	1.18	1.38
Ireland	1996	0.58	0.96	0.96	1.22	1.69	1.08	1.29	1.18	1.38
Germany	1985	0.58	0.96	0.96	1.22	1.69	1.08	1.29	1.18	1.38
Sweden	1999	0.58	0.96	0.96	1.22	1.69	1.08	1.30	1.18	1.38
Finland	1996	0.58	0.96	0.96	1.22	1.70	1.08	1.30	1.18	1.38
Portugal	1996	0.58	0.96	0.96	1.22	1.70	1.08	1.30	1.18	1.38
Spain	1993	0.58	0.96	0.96	1.22	1.70	1.08	1.30	1.18	1.38
Greece	1999	0.58	0.96	0.96	1.22	1.70	1.08	1.30	1.18	1.38
Portugal	1999	0.58	0.96	0.96	1.22	1.70	1.08	1.30	1.18	1.38
Portugal	1993	0.58	0.96	0.96	1.22	1.70	1.08	1.30	1.18	1.38
Greece	1996	0.58	0.96	0.96	1.22	1.71	1.08	1.30	1.18	1.38
Finland	1993	0.58	0.96	0.96	1.22	1.71	1.08	1.30	1.18	1.38
Italy	1985	0.58	0.96	0.96	1.22	1.71	1.08	1.30	1.18	1.38
Australia	1985	0.58	0.96	0.96	1.22	1.71	1.08	1.30	1.18	1.38
Japan	1985	0.58	0.96	0.96	1.22	1.71	1.08	1.30	1.18	1.38
Belgium	1985	0.58	0.96	0.96	1.22	1.71	1.08	1.30	1.18	1.38
New Zealand	1990	0.59	0.96	0.96	1.22	1.72	1.08	1.30	1.18	1.38
Greece	1993	0.59	0.96	0.96	1.22	1.72	1.08	1.30	1.18	1.39
Netherlands	1985	0.59	0.96	0.96	1.22	1.73	1.08	1.30	1.18	1.39
Finland	1990	0.59	0.96	0.96	1.22	1.73	1.08	1.30	1.18	1.39
Finland	1999	0.59	0.96	0.96	1.22	1.73	1.08	1.30	1.18	1.39
Ireland	1993	0.59	0.96	0.96	1.22	1.73	1.08	1.30	1.18	1.39
Denmark	1985	0.59	0.96	0.96	1.22	1.74	1.08	1.30	1.18	1.39

Note: Countries were sorted by real income per capita.

Table 5.2. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	0.60	0.96	0.96	1.22	1.75	1.08	1.30	1.18	1.39
United Kingdom	1985	0.60	0.96	0.96	1.22	1.76	1.08	1.31	1.18	1.40
Israel	1999	0.60	0.96	0.96	1.22	1.76	1.08	1.31	1.18	1.40
New Zealand	1985	0.60	0.96	0.96	1.22	1.78	1.08	1.31	1.18	1.40
Sweden	1985	0.60	0.96	0.96	1.23	1.78	1.08	1.31	1.18	1.40
Spain	1990	0.61	0.96	0.96	1.23	1.78	1.08	1.31	1.18	1.40
Norway	1985	0.61	0.96	0.96	1.23	1.79	1.08	1.31	1.18	1.40
Austria	1985	0.61	0.96	0.96	1.23	1.79	1.08	1.31	1.18	1.40
Slovenia	1996	0.61	0.96	0.96	1.23	1.79	1.08	1.31	1.18	1.40
Slovenia	1999	0.62	0.96	0.96	1.23	1.83	1.08	1.32	1.19	1.41
Czech Republic	1996	0.62	0.96	0.96	1.23	1.85	1.08	1.32	1.19	1.42
Finland	1985	0.62	0.96	0.96	1.23	1.85	1.08	1.32	1.19	1.42
Spain	1985	0.62	0.96	0.96	1.23	1.87	1.08	1.32	1.19	1.42
Korea	1999	0.63	0.96	0.96	1.23	1.88	1.08	1.32	1.19	1.42
Czech Republic	1999	0.63	0.96	0.96	1.23	1.89	1.08	1.33	1.19	1.43
Portugal	1990	0.63	0.96	0.96	1.24	1.92	1.08	1.33	1.19	1.43
Ireland	1990	0.64	0.96	0.96	1.24	1.97	1.08	1.34	1.19	1.45
Greece	1990	0.64	0.96	0.96	1.24	1.99	1.08	1.34	1.19	1.45
Hungary	1996	0.65	0.96	0.96	1.24	2.07	1.08	1.35	1.20	1.47
Mexico	1996	0.66	0.96	0.96	1.25	2.10	1.09	1.35	1.20	1.47
Estonia	1999	0.66	0.96	0.96	1.25	2.11	1.09	1.35	1.20	1.47
Hungary	1999	0.66	0.96	0.96	1.25	2.11	1.09	1.35	1.20	1.47
Greece	1985	0.66	0.96	0.96	1.25	2.13	1.09	1.35	1.20	1.48
Slovak Republic	1999	0.66	0.96	0.96	1.25	2.13	1.09	1.35	1.20	1.48
Slovak Republic	1996	0.67	0.96	0.96	1.25	2.22	1.09	1.36	1.20	1.49

Note: Countries were sorted by real income per capita.

Table 5.2. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	0.67	0.96	0.96	1.25	2.25	1.09	1.36	1.20	1.50
Mexico	1999	0.67	0.96	0.96	1.25	2.25	1.09	1.36	1.20	1.50
Poland	1999	0.67	0.96	0.96	1.25	2.26	1.09	1.36	1.20	1.50
Poland	1996	0.67	0.96	0.96	1.25	2.29	1.09	1.37	1.20	1.50
Ireland	1985	0.67	0.96	0.96	1.26	2.32	1.09	1.37	1.20	1.51
Bulgaria	1999	0.67	0.96	0.96	1.26	2.32	1.09	1.37	1.20	1.51
Russian Federation	1996	0.68	0.96	0.96	1.26	2.38	1.09	1.37	1.20	1.52
Croatia	1999	0.68	0.96	0.96	1.26	2.46	1.09	1.38	1.21	1.53
Portugal	1985	0.68	0.96	0.96	1.26	2.47	1.09	1.38	1.21	1.53
Latvia	1999	0.69	0.96	0.96	1.26	2.58	1.09	1.39	1.21	1.54
Turkey	1999	0.69	0.96	0.96	1.27	2.72	1.09	1.40	1.21	1.56
Macedonia	1999	0.69	0.96	0.96	1.27	2.76	1.09	1.40	1.21	1.56
Russian Federation	1999	0.71	0.96	0.96	1.29	4.14	1.09	1.44	1.22	1.65
Romania	1999	0.71	0.96	0.96	1.29	4.24	1.09	1.44	1.22	1.66
Ukraine	1999	0.73	0.96	0.96	1.31	10.84	1.09	1.49	1.23	1.76
Average		0.57	0.96	0.96	1.22	1.85	1.08	1.30	1.18	1.39

Note: Countries were sorted by real income per capita.

Table 5.3. Frisch own-price elasticities for nine broad consumption groups, pooled data

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	-0.32	-0.75	-0.75	-0.93	-1.15	-0.84	-0.98	-0.91	-1.02
Luxembourg	1993	-0.32	-0.75	-0.75	-0.93	-1.15	-0.84	-0.98	-0.91	-1.02
United States	1996	-0.32	-0.75	-0.75	-0.93	-1.15	-0.84	-0.98	-0.91	-1.02
Luxembourg	1996	-0.32	-0.75	-0.75	-0.93	-1.15	-0.84	-0.98	-0.91	-1.02
United States	1993	-0.33	-0.75	-0.75	-0.93	-1.16	-0.84	-0.98	-0.91	-1.02
United States	1999	-0.33	-0.75	-0.75	-0.93	-1.16	-0.84	-0.98	-0.91	-1.02
Switzerland	1993	-0.37	-0.75	-0.75	-0.94	-1.20	-0.84	-0.99	-0.91	-1.04
United States	1990	-0.38	-0.75	-0.75	-0.94	-1.20	-0.84	-0.99	-0.91	-1.04
Switzerland	1996	-0.38	-0.75	-0.75	-0.94	-1.20	-0.84	-0.99	-0.91	-1.04
United States	1985	-0.38	-0.75	-0.75	-0.94	-1.21	-0.85	-0.99	-0.91	-1.04
Japan	1996	-0.39	-0.75	-0.75	-0.94	-1.21	-0.85	-0.99	-0.91	-1.04
Switzerland	1999	-0.39	-0.75	-0.75	-0.94	-1.21	-0.85	-0.99	-0.91	-1.04
Belgium	1996	-0.39	-0.75	-0.75	-0.94	-1.22	-0.85	-0.99	-0.91	-1.04
Belgium	1993	-0.40	-0.75	-0.75	-0.94	-1.22	-0.85	-0.99	-0.91	-1.04
Japan	1993	-0.40	-0.75	-0.75	-0.94	-1.22	-0.85	-0.99	-0.91	-1.04
Cyprus	1999	-0.40	-0.75	-0.75	-0.94	-1.22	-0.85	-0.99	-0.91	-1.04
Luxembourg	1990	-0.40	-0.75	-0.75	-0.94	-1.22	-0.85	-0.99	-0.91	-1.04
Germany	1996	-0.40	-0.75	-0.75	-0.94	-1.22	-0.85	-0.99	-0.91	-1.05
Canada	1996	-0.40	-0.75	-0.75	-0.94	-1.23	-0.85	-0.99	-0.92	-1.05
Germany	1993	-0.40	-0.75	-0.75	-0.94	-1.23	-0.85	-0.99	-0.92	-1.05
Canada	1993	-0.40	-0.75	-0.75	-0.94	-1.23	-0.85	-0.99	-0.92	-1.05
Australia	1996	-0.40	-0.75	-0.75	-0.94	-1.23	-0.85	-1.00	-0.92	-1.05
France	1993	-0.40	-0.75	-0.75	-0.94	-1.23	-0.85	-1.00	-0.92	-1.05
Iceland	1996	-0.41	-0.75	-0.75	-0.94	-1.23	-0.85	-1.00	-0.92	-1.05
Switzerland	1990	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05

Note: Countries were sorted by real income per capita.

Table 5.3. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Netherlands	1996	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Italy	1993	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Netherlands	1993	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Austria	1993	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Iceland	1999	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Austria	1996	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Italy	1999	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Italy	1996	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
Denmark	1996	-0.41	-0.75	-0.75	-0.94	-1.24	-0.85	-1.00	-0.92	-1.05
France	1996	-0.41	-0.75	-0.75	-0.94	-1.25	-0.85	-1.00	-0.92	-1.05
Australia	1993	-0.41	-0.75	-0.75	-0.94	-1.25	-0.85	-1.00	-0.92	-1.05
Italy	1990	-0.42	-0.75	-0.75	-0.95	-1.26	-0.85	-1.00	-0.92	-1.06
Iceland	1993	-0.42	-0.75	-0.75	-0.95	-1.26	-0.85	-1.00	-0.92	-1.06
Germany	1990	-0.42	-0.75	-0.75	-0.95	-1.26	-0.85	-1.00	-0.92	-1.06
France	1990	-0.42	-0.75	-0.75	-0.95	-1.26	-0.85	-1.00	-0.92	-1.06
Canada	1999	-0.42	-0.75	-0.75	-0.95	-1.26	-0.85	-1.00	-0.92	-1.06
Canada	1985	-0.42	-0.75	-0.75	-0.95	-1.26	-0.85	-1.00	-0.92	-1.06
United Kingdom	1996	-0.42	-0.75	-0.75	-0.95	-1.26	-0.85	-1.00	-0.92	-1.06
Denmark	1999	-0.42	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
United Kingdom	1993	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
Denmark	1993	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
Germany	1999	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
Australia	1999	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
Norway	1996	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06

Note: Countries were sorted by real income per capita.

Table 5.3. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
Norway	1999	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
Canada	1990	-0.43	-0.75	-0.75	-0.95	-1.27	-0.85	-1.00	-0.92	-1.06
New Zealand	1996	-0.43	-0.75	-0.75	-0.95	-1.28	-0.85	-1.00	-0.92	-1.06
Belgium	1990	-0.43	-0.75	-0.75	-0.95	-1.28	-0.85	-1.00	-0.92	-1.06
Norway	1993	-0.43	-0.75	-0.75	-0.95	-1.28	-0.85	-1.01	-0.92	-1.06
France	1999	-0.43	-0.75	-0.75	-0.95	-1.28	-0.85	-1.01	-0.92	-1.06
Belgium	1999	-0.43	-0.75	-0.75	-0.95	-1.28	-0.85	-1.01	-0.92	-1.06
Japan	1990	-0.43	-0.75	-0.75	-0.95	-1.28	-0.85	-1.01	-0.92	-1.07
Netherlands	1999	-0.44	-0.75	-0.75	-0.95	-1.29	-0.85	-1.01	-0.92	-1.07
Austria	1990	-0.44	-0.75	-0.75	-0.95	-1.29	-0.85	-1.01	-0.92	-1.07
New Zealand	1993	-0.44	-0.75	-0.75	-0.95	-1.29	-0.85	-1.01	-0.92	-1.07
Iceland	1990	-0.44	-0.75	-0.75	-0.95	-1.29	-0.85	-1.01	-0.92	-1.07
United Kingdom	1990	-0.44	-0.75	-0.75	-0.95	-1.29	-0.85	-1.01	-0.92	-1.07
Denmark	1990	-0.44	-0.75	-0.75	-0.95	-1.30	-0.85	-1.01	-0.92	-1.07
Netherlands	1990	-0.44	-0.75	-0.75	-0.95	-1.30	-0.85	-1.01	-0.92	-1.07
Luxembourg	1985	-0.44	-0.75	-0.75	-0.95	-1.30	-0.85	-1.01	-0.92	-1.07
Spain	1996	-0.44	-0.75	-0.75	-0.95	-1.30	-0.85	-1.01	-0.92	-1.07
Japan	1999	-0.44	-0.75	-0.75	-0.95	-1.31	-0.85	-1.01	-0.92	-1.07
Israel	1996	-0.44	-0.75	-0.75	-0.95	-1.31	-0.85	-1.01	-0.92	-1.07
Australia	1990	-0.45	-0.75	-0.75	-0.95	-1.31	-0.85	-1.01	-0.92	-1.07
Sweden	1996	-0.45	-0.75	-0.75	-0.95	-1.31	-0.85	-1.01	-0.92	-1.07
Sweden	1993	-0.45	-0.75	-0.75	-0.95	-1.31	-0.85	-1.01	-0.92	-1.07
Spain	1999	-0.45	-0.75	-0.75	-0.95	-1.31	-0.85	-1.01	-0.92	-1.07
Ireland	1999	-0.45	-0.75	-0.75	-0.95	-1.31	-0.85	-1.01	-0.92	-1.07

Note: Countries were sorted by real income per capita.

Table 5.3. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	-0.45	-0.75	-0.75	-0.95	-1.32	-0.85	-1.01	-0.92	-1.08
Sweden	1990	-0.45	-0.75	-0.75	-0.95	-1.32	-0.85	-1.01	-0.92	-1.08
France	1985	-0.45	-0.75	-0.75	-0.95	-1.32	-0.85	-1.01	-0.92	-1.08
Ireland	1996	-0.45	-0.75	-0.75	-0.95	-1.32	-0.85	-1.01	-0.92	-1.08
Germany	1985	-0.45	-0.75	-0.75	-0.95	-1.33	-0.85	-1.01	-0.92	-1.08
Sweden	1999	-0.45	-0.75	-0.75	-0.95	-1.33	-0.85	-1.01	-0.92	-1.08
Finland	1996	-0.45	-0.75	-0.75	-0.95	-1.33	-0.85	-1.01	-0.92	-1.08
Portugal	1996	-0.45	-0.75	-0.75	-0.95	-1.33	-0.85	-1.01	-0.92	-1.08
Spain	1993	-0.45	-0.75	-0.75	-0.95	-1.33	-0.85	-1.02	-0.92	-1.08
Greece	1999	-0.45	-0.75	-0.75	-0.95	-1.33	-0.85	-1.02	-0.92	-1.08
Portugal	1999	-0.46	-0.75	-0.75	-0.95	-1.33	-0.85	-1.02	-0.92	-1.08
Portugal	1993	-0.46	-0.75	-0.75	-0.95	-1.33	-0.85	-1.02	-0.92	-1.08
Greece	1996	-0.46	-0.75	-0.75	-0.95	-1.34	-0.85	-1.02	-0.92	-1.08
Finland	1993	-0.46	-0.75	-0.75	-0.95	-1.34	-0.85	-1.02	-0.92	-1.08
Italy	1985	-0.46	-0.75	-0.75	-0.95	-1.34	-0.85	-1.02	-0.92	-1.08
Australia	1985	-0.46	-0.75	-0.75	-0.95	-1.34	-0.85	-1.02	-0.92	-1.08
Japan	1985	-0.46	-0.75	-0.75	-0.95	-1.34	-0.85	-1.02	-0.92	-1.08
Belgium	1985	-0.46	-0.75	-0.75	-0.95	-1.34	-0.85	-1.02	-0.92	-1.08
New Zealand	1990	-0.46	-0.75	-0.75	-0.96	-1.34	-0.85	-1.02	-0.92	-1.08
Greece	1993	-0.46	-0.75	-0.75	-0.96	-1.35	-0.85	-1.02	-0.92	-1.09
Netherlands	1985	-0.46	-0.75	-0.75	-0.96	-1.35	-0.85	-1.02	-0.92	-1.09
Finland	1990	-0.46	-0.75	-0.75	-0.96	-1.36	-0.85	-1.02	-0.92	-1.09
Finland	1999	-0.46	-0.75	-0.75	-0.96	-1.36	-0.85	-1.02	-0.92	-1.09
Ireland	1993	-0.46	-0.75	-0.75	-0.96	-1.36	-0.85	-1.02	-0.92	-1.09
Denmark	1985	-0.47	-0.75	-0.75	-0.96	-1.37	-0.85	-1.02	-0.93	-1.09

Note: Countries were sorted by real income per capita.

Table 5.3. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	-0.47	-0.75	-0.75	-0.96	-1.37	-0.85	-1.02	-0.93	-1.09
United Kingdom	1985	-0.47	-0.75	-0.75	-0.96	-1.38	-0.85	-1.02	-0.93	-1.09
Israel	1999	-0.47	-0.75	-0.75	-0.96	-1.38	-0.85	-1.02	-0.93	-1.09
New Zealand	1985	-0.47	-0.75	-0.75	-0.96	-1.39	-0.85	-1.03	-0.93	-1.10
Sweden	1985	-0.47	-0.75	-0.75	-0.96	-1.40	-0.85	-1.03	-0.93	-1.10
Spain	1990	-0.47	-0.75	-0.75	-0.96	-1.40	-0.85	-1.03	-0.93	-1.10
Norway	1985	-0.47	-0.75	-0.75	-0.96	-1.40	-0.85	-1.03	-0.93	-1.10
Austria	1985	-0.47	-0.75	-0.75	-0.96	-1.40	-0.85	-1.03	-0.93	-1.10
Slovenia	1996	-0.48	-0.75	-0.75	-0.96	-1.41	-0.85	-1.03	-0.93	-1.10
Slovenia	1999	-0.48	-0.75	-0.75	-0.96	-1.43	-0.85	-1.03	-0.93	-1.11
Czech Republic	1996	-0.49	-0.75	-0.75	-0.96	-1.45	-0.85	-1.03	-0.93	-1.11
Finland	1985	-0.49	-0.75	-0.75	-0.96	-1.45	-0.85	-1.03	-0.93	-1.11
Spain	1985	-0.49	-0.75	-0.75	-0.97	-1.46	-0.85	-1.04	-0.93	-1.11
Korea	1999	-0.49	-0.75	-0.75	-0.97	-1.47	-0.85	-1.04	-0.93	-1.12
Czech Republic	1999	-0.49	-0.75	-0.75	-0.97	-1.48	-0.85	-1.04	-0.93	-1.12
Portugal	1990	-0.50	-0.75	-0.75	-0.97	-1.50	-0.85	-1.04	-0.93	-1.12
Ireland	1990	-0.50	-0.75	-0.75	-0.97	-1.55	-0.85	-1.05	-0.93	-1.13
Greece	1990	-0.50	-0.75	-0.75	-0.97	-1.56	-0.85	-1.05	-0.93	-1.14
Hungary	1996	-0.51	-0.75	-0.75	-0.97	-1.62	-0.85	-1.06	-0.94	-1.15
Mexico	1996	-0.51	-0.75	-0.75	-0.98	-1.65	-0.85	-1.06	-0.94	-1.15
Estonia	1999	-0.51	-0.75	-0.75	-0.98	-1.65	-0.85	-1.06	-0.94	-1.15
Hungary	1999	-0.51	-0.75	-0.75	-0.98	-1.66	-0.85	-1.06	-0.94	-1.15
Greece	1985	-0.52	-0.75	-0.75	-0.98	-1.67	-0.85	-1.06	-0.94	-1.16
Slovak Republic	1999	-0.52	-0.75	-0.75	-0.98	-1.67	-0.85	-1.06	-0.94	-1.16
Slovak Republic	1996	-0.52	-0.75	-0.75	-0.98	-1.74	-0.85	-1.07	-0.94	-1.17

Note: Countries were sorted by real income per capita.

Table 5.3. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	-0.52	-0.75	-0.75	-0.98	-1.76	-0.85	-1.07	-0.94	-1.17
Mexico	1999	-0.52	-0.75	-0.75	-0.98	-1.76	-0.85	-1.07	-0.94	-1.17
Poland	1999	-0.52	-0.75	-0.75	-0.98	-1.77	-0.85	-1.07	-0.94	-1.17
Poland	1996	-0.52	-0.75	-0.75	-0.98	-1.79	-0.85	-1.07	-0.94	-1.18
Ireland	1985	-0.53	-0.75	-0.75	-0.98	-1.82	-0.85	-1.07	-0.94	-1.18
Bulgaria	1999	-0.53	-0.75	-0.75	-0.98	-1.82	-0.85	-1.07	-0.94	-1.18
Russian Federation	1996	-0.53	-0.75	-0.75	-0.98	-1.87	-0.85	-1.08	-0.94	-1.19
Croatia	1999	-0.53	-0.75	-0.75	-0.99	-1.92	-0.85	-1.08	-0.94	-1.20
Portugal	1985	-0.53	-0.75	-0.75	-0.99	-1.93	-0.85	-1.08	-0.94	-1.20
Latvia	1999	-0.54	-0.75	-0.75	-0.99	-2.02	-0.85	-1.09	-0.95	-1.21
Turkey	1999	-0.54	-0.75	-0.75	-0.99	-2.13	-0.85	-1.09	-0.95	-1.22
Macedonia	1999	-0.54	-0.75	-0.75	-0.99	-2.16	-0.85	-1.09	-0.95	-1.22
Russian Federation	1999	-0.56	-0.75	-0.76	-1.01	-3.25	-0.85	-1.13	-0.96	-1.29
Romania	1999	-0.56	-0.75	-0.76	-1.01	-3.32	-0.85	-1.13	-0.96	-1.30
Ukraine	1999	-0.57	-0.75	-0.76	-1.02	-8.49	-0.85	-1.17	-0.97	-1.38
Average		-0.45	-0.75	-0.75	-0.96	-1.45	-0.85	-1.02	-0.92	-1.09

Note: Countries were sorted by real income per capita.

Table 5.4. Slutsky own-price elasticities for nine broad consumption groups, pooled data

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	-0.29	-0.71	-0.62	-0.85	-1.02	-0.71	-0.87	-0.81	-0.90
Luxembourg	1993	-0.29	-0.71	-0.62	-0.85	-1.02	-0.71	-0.87	-0.81	-0.90
United States	1996	-0.29	-0.71	-0.62	-0.85	-1.02	-0.71	-0.87	-0.81	-0.90
Luxembourg	1996	-0.30	-0.71	-0.62	-0.85	-1.02	-0.71	-0.87	-0.81	-0.90
United States	1993	-0.30	-0.71	-0.62	-0.85	-1.03	-0.71	-0.87	-0.82	-0.91
United States	1999	-0.30	-0.71	-0.62	-0.85	-1.03	-0.71	-0.87	-0.82	-0.91
Switzerland	1993	-0.33	-0.71	-0.62	-0.86	-1.07	-0.71	-0.88	-0.82	-0.93
United States	1990	-0.34	-0.71	-0.62	-0.86	-1.07	-0.71	-0.88	-0.82	-0.93
Switzerland	1996	-0.34	-0.71	-0.62	-0.86	-1.08	-0.71	-0.89	-0.82	-0.93
United States	1985	-0.34	-0.71	-0.62	-0.86	-1.08	-0.71	-0.89	-0.82	-0.93
Japan	1996	-0.35	-0.71	-0.62	-0.86	-1.09	-0.71	-0.89	-0.82	-0.93
Switzerland	1999	-0.35	-0.71	-0.62	-0.86	-1.09	-0.71	-0.89	-0.82	-0.93
Belgium	1996	-0.35	-0.71	-0.62	-0.86	-1.09	-0.71	-0.89	-0.82	-0.93
Belgium	1993	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.82	-0.94
Japan	1993	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.82	-0.94
Cyprus	1999	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Luxembourg	1990	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Germany	1996	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Canada	1996	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Germany	1993	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Canada	1993	-0.35	-0.71	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Australia	1996	-0.35	-0.71	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
France	1993	-0.35	-0.71	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Iceland	1996	-0.36	-0.71	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Switzerland	1990	-0.36	-0.71	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94

Note: Countries were sorted by real income per capita.

Table 5.4. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	-0.36	-0.71	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Netherlands	1996	-0.36	-0.71	-0.62	-0.86	-1.11	-0.71	-0.90	-0.83	-0.94
Italy	1993	-0.36	-0.71	-0.62	-0.86	-1.11	-0.71	-0.90	-0.83	-0.94
Netherlands	1993	-0.36	-0.71	-0.62	-0.86	-1.12	-0.71	-0.90	-0.83	-0.94
Austria	1993	-0.36	-0.71	-0.62	-0.86	-1.12	-0.71	-0.90	-0.83	-0.94
Iceland	1999	-0.36	-0.71	-0.62	-0.86	-1.12	-0.71	-0.90	-0.83	-0.94
Austria	1996	-0.36	-0.71	-0.62	-0.86	-1.12	-0.71	-0.90	-0.83	-0.94
Italy	1999	-0.36	-0.71	-0.62	-0.86	-1.12	-0.71	-0.90	-0.83	-0.94
Italy	1996	-0.36	-0.71	-0.62	-0.86	-1.12	-0.71	-0.90	-0.83	-0.94
Denmark	1996	-0.36	-0.71	-0.62	-0.86	-1.12	-0.71	-0.90	-0.83	-0.94
France	1996	-0.36	-0.71	-0.62	-0.87	-1.12	-0.71	-0.90	-0.83	-0.95
Australia	1993	-0.36	-0.71	-0.62	-0.87	-1.12	-0.71	-0.90	-0.83	-0.95
Italy	1990	-0.36	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
Iceland	1993	-0.36	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
Germany	1990	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
France	1990	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
Canada	1999	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
Canada	1985	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
United Kingdom	1996	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
Denmark	1999	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
United Kingdom	1993	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
Denmark	1993	-0.37	-0.71	-0.62	-0.87	-1.14	-0.71	-0.90	-0.83	-0.95
Germany	1999	-0.37	-0.71	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.95
Australia	1999	-0.37	-0.71	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.96
Norway	1996	-0.37	-0.71	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.96

Note: Countries were sorted by real income per capita.

Table 5.4. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	-0.37	-0.71	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.96
Norway	1999	-0.37	-0.71	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.96
Canada	1990	-0.37	-0.71	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.96
New Zealand	1996	-0.37	-0.71	-0.62	-0.87	-1.15	-0.72	-0.91	-0.83	-0.96
Belgium	1990	-0.37	-0.71	-0.62	-0.87	-1.15	-0.72	-0.91	-0.83	-0.96
Norway	1993	-0.37	-0.71	-0.62	-0.87	-1.16	-0.72	-0.91	-0.83	-0.96
France	1999	-0.37	-0.71	-0.62	-0.87	-1.16	-0.72	-0.91	-0.83	-0.96
Belgium	1999	-0.37	-0.71	-0.62	-0.87	-1.16	-0.72	-0.91	-0.83	-0.96
Japan	1990	-0.37	-0.71	-0.62	-0.87	-1.16	-0.72	-0.91	-0.83	-0.96
Netherlands	1999	-0.37	-0.71	-0.62	-0.87	-1.17	-0.72	-0.91	-0.83	-0.96
Austria	1990	-0.37	-0.71	-0.62	-0.87	-1.17	-0.72	-0.91	-0.83	-0.96
New Zealand	1993	-0.37	-0.71	-0.62	-0.87	-1.17	-0.72	-0.91	-0.83	-0.96
Iceland	1990	-0.37	-0.71	-0.62	-0.87	-1.17	-0.72	-0.91	-0.83	-0.96
United Kingdom	1990	-0.37	-0.71	-0.62	-0.87	-1.17	-0.72	-0.91	-0.83	-0.96
Denmark	1990	-0.38	-0.71	-0.62	-0.87	-1.18	-0.72	-0.91	-0.83	-0.97
Netherlands	1990	-0.38	-0.71	-0.62	-0.87	-1.18	-0.72	-0.91	-0.83	-0.97
Luxembourg	1985	-0.38	-0.71	-0.62	-0.87	-1.18	-0.72	-0.91	-0.83	-0.97
Spain	1996	-0.38	-0.71	-0.62	-0.87	-1.18	-0.72	-0.91	-0.83	-0.97
Japan	1999	-0.38	-0.71	-0.62	-0.87	-1.19	-0.72	-0.91	-0.83	-0.97
Israel	1996	-0.38	-0.71	-0.62	-0.87	-1.19	-0.72	-0.91	-0.83	-0.97
Australia	1990	-0.38	-0.71	-0.62	-0.87	-1.19	-0.72	-0.91	-0.83	-0.97
Sweden	1996	-0.38	-0.71	-0.62	-0.87	-1.19	-0.72	-0.91	-0.83	-0.97
Sweden	1993	-0.38	-0.71	-0.62	-0.87	-1.19	-0.72	-0.91	-0.84	-0.97
Spain	1999	-0.38	-0.71	-0.62	-0.88	-1.19	-0.72	-0.91	-0.84	-0.97
Ireland	1999	-0.38	-0.71	-0.62	-0.88	-1.19	-0.72	-0.91	-0.84	-0.97

Note: Countries were sorted by real income per capita.

Table 5.4. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	-0.38	-0.71	-0.62	-0.88	-1.20	-0.72	-0.92	-0.84	-0.97
Sweden	1990	-0.38	-0.71	-0.62	-0.88	-1.20	-0.72	-0.92	-0.84	-0.97
France	1985	-0.38	-0.71	-0.62	-0.88	-1.20	-0.72	-0.92	-0.84	-0.97
Ireland	1996	-0.38	-0.71	-0.62	-0.88	-1.21	-0.72	-0.92	-0.84	-0.98
Germany	1985	-0.38	-0.71	-0.62	-0.88	-1.21	-0.72	-0.92	-0.84	-0.98
Sweden	1999	-0.38	-0.71	-0.62	-0.88	-1.21	-0.72	-0.92	-0.84	-0.98
Finland	1996	-0.38	-0.71	-0.62	-0.88	-1.21	-0.72	-0.92	-0.84	-0.98
Portugal	1996	-0.38	-0.71	-0.62	-0.88	-1.21	-0.72	-0.92	-0.84	-0.98
Spain	1993	-0.38	-0.71	-0.62	-0.88	-1.21	-0.72	-0.92	-0.84	-0.98
Greece	1999	-0.38	-0.71	-0.62	-0.88	-1.21	-0.72	-0.92	-0.84	-0.98
Portugal	1999	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
Portugal	1993	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
Greece	1996	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
Finland	1993	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
Italy	1985	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
Australia	1985	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
Japan	1985	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
Belgium	1985	-0.38	-0.71	-0.62	-0.88	-1.22	-0.72	-0.92	-0.84	-0.98
New Zealand	1990	-0.38	-0.71	-0.62	-0.88	-1.23	-0.72	-0.92	-0.84	-0.98
Greece	1993	-0.38	-0.71	-0.62	-0.88	-1.23	-0.72	-0.92	-0.84	-0.98
Netherlands	1985	-0.39	-0.71	-0.62	-0.88	-1.24	-0.72	-0.92	-0.84	-0.99
Finland	1990	-0.39	-0.71	-0.62	-0.88	-1.24	-0.72	-0.92	-0.84	-0.99
Finland	1999	-0.39	-0.71	-0.62	-0.88	-1.24	-0.72	-0.92	-0.84	-0.99
Ireland	1993	-0.39	-0.71	-0.62	-0.88	-1.24	-0.72	-0.92	-0.84	-0.99
Denmark	1985	-0.39	-0.71	-0.62	-0.88	-1.25	-0.72	-0.93	-0.84	-0.99

Note: Countries were sorted by real income per capita.

Table 5.4. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	-0.39	-0.71	-0.62	-0.88	-1.25	-0.72	-0.93	-0.84	-0.99
United Kingdom	1985	-0.39	-0.71	-0.62	-0.88	-1.26	-0.72	-0.93	-0.84	-0.99
Israel	1999	-0.39	-0.71	-0.62	-0.88	-1.26	-0.72	-0.93	-0.84	-0.99
New Zealand	1985	-0.39	-0.71	-0.62	-0.88	-1.28	-0.72	-0.93	-0.84	-1.00
Sweden	1985	-0.39	-0.71	-0.62	-0.88	-1.28	-0.72	-0.93	-0.84	-1.00
Spain	1990	-0.39	-0.71	-0.62	-0.89	-1.28	-0.72	-0.93	-0.84	-1.00
Norway	1985	-0.39	-0.71	-0.62	-0.89	-1.28	-0.72	-0.93	-0.84	-1.00
Austria	1985	-0.39	-0.71	-0.62	-0.89	-1.28	-0.72	-0.93	-0.84	-1.00
Slovenia	1996	-0.39	-0.71	-0.62	-0.89	-1.29	-0.72	-0.93	-0.84	-1.00
Slovenia	1999	-0.39	-0.72	-0.62	-0.89	-1.32	-0.72	-0.94	-0.85	-1.01
Czech Republic	1996	-0.39	-0.72	-0.62	-0.89	-1.33	-0.72	-0.94	-0.85	-1.01
Finland	1985	-0.39	-0.72	-0.62	-0.89	-1.34	-0.72	-0.94	-0.85	-1.01
Spain	1985	-0.40	-0.72	-0.62	-0.89	-1.35	-0.72	-0.94	-0.85	-1.02
Korea	1999	-0.40	-0.72	-0.62	-0.89	-1.35	-0.72	-0.94	-0.85	-1.02
Czech Republic	1999	-0.40	-0.72	-0.62	-0.89	-1.37	-0.72	-0.95	-0.85	-1.02
Portugal	1990	-0.40	-0.72	-0.62	-0.90	-1.39	-0.72	-0.95	-0.85	-1.03
Ireland	1990	-0.40	-0.72	-0.62	-0.90	-1.43	-0.72	-0.96	-0.85	-1.04
Greece	1990	-0.40	-0.72	-0.62	-0.90	-1.45	-0.72	-0.96	-0.85	-1.04
Hungary	1996	-0.40	-0.72	-0.62	-0.90	-1.51	-0.72	-0.97	-0.86	-1.05
Mexico	1996	-0.40	-0.72	-0.62	-0.91	-1.53	-0.72	-0.97	-0.86	-1.06
Estonia	1999	-0.40	-0.72	-0.62	-0.91	-1.54	-0.72	-0.97	-0.86	-1.06
Hungary	1999	-0.40	-0.72	-0.62	-0.91	-1.54	-0.72	-0.97	-0.86	-1.06
Greece	1985	-0.40	-0.72	-0.62	-0.91	-1.55	-0.73	-0.97	-0.86	-1.06
Slovak Republic	1999	-0.40	-0.72	-0.62	-0.91	-1.55	-0.73	-0.97	-0.86	-1.06
Slovak Republic	1996	-0.40	-0.72	-0.62	-0.91	-1.62	-0.73	-0.98	-0.86	-1.08

Note: Countries were sorted by real income per capita.

Table 5.4. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	-0.40	-0.72	-0.62	-0.91	-1.64	-0.73	-0.98	-0.86	-1.08
Mexico	1999	-0.40	-0.72	-0.62	-0.91	-1.64	-0.73	-0.98	-0.86	-1.08
Poland	1999	-0.40	-0.72	-0.62	-0.91	-1.66	-0.73	-0.98	-0.86	-1.08
Poland	1996	-0.40	-0.72	-0.62	-0.91	-1.67	-0.73	-0.98	-0.86	-1.09
Ireland	1985	-0.40	-0.72	-0.62	-0.91	-1.70	-0.73	-0.99	-0.86	-1.09
Bulgaria	1999	-0.40	-0.72	-0.62	-0.91	-1.70	-0.73	-0.99	-0.86	-1.09
Russian Federation	1996	-0.40	-0.72	-0.62	-0.92	-1.75	-0.73	-0.99	-0.86	-1.10
Croatia	1999	-0.40	-0.72	-0.62	-0.92	-1.81	-0.73	-0.99	-0.87	-1.11
Portugal	1985	-0.40	-0.72	-0.62	-0.92	-1.81	-0.73	-1.00	-0.87	-1.11
Latvia	1999	-0.40	-0.72	-0.62	-0.92	-1.90	-0.73	-1.00	-0.87	-1.12
Turkey	1999	-0.40	-0.72	-0.62	-0.93	-2.00	-0.73	-1.01	-0.87	-1.13
Macedonia	1999	-0.40	-0.72	-0.62	-0.93	-2.03	-0.73	-1.01	-0.87	-1.13
Russian Federation	1999	-0.40	-0.72	-0.62	-0.94	-3.09	-0.73	-1.05	-0.88	-1.21
Romania	1999	-0.40	-0.72	-0.62	-0.94	-3.16	-0.73	-1.05	-0.88	-1.21
Ukraine	1999	-0.40	-0.72	-0.62	-0.96	-8.15	-0.74	-1.09	-0.89	-1.30
Average		-0.37	-0.71	-0.62	-0.88	-1.32	-0.72	-0.92	-0.84	-0.99

Note: Countries were sorted by real income per capita.

Table 5.5. Cournot own-price elasticities for nine broad consumption groups, pooled data

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	-0.37	-0.76	-0.80	-0.94	-1.13	-0.87	-0.98	-0.92	-1.02
Luxembourg	1993	-0.37	-0.76	-0.80	-0.94	-1.13	-0.87	-0.98	-0.92	-1.02
United States	1996	-0.37	-0.76	-0.80	-0.94	-1.13	-0.87	-0.98	-0.92	-1.02
Luxembourg	1996	-0.38	-0.76	-0.80	-0.94	-1.14	-0.87	-0.98	-0.92	-1.02
United States	1993	-0.39	-0.76	-0.80	-0.94	-1.14	-0.87	-0.98	-0.92	-1.02
United States	1999	-0.39	-0.76	-0.80	-0.94	-1.14	-0.87	-0.98	-0.92	-1.02
Switzerland	1993	-0.44	-0.76	-0.80	-0.94	-1.18	-0.87	-0.99	-0.92	-1.03
United States	1990	-0.44	-0.76	-0.80	-0.94	-1.18	-0.87	-0.99	-0.92	-1.03
Switzerland	1996	-0.45	-0.76	-0.80	-0.94	-1.18	-0.87	-0.99	-0.92	-1.03
United States	1985	-0.45	-0.76	-0.80	-0.94	-1.19	-0.87	-0.99	-0.92	-1.04
Japan	1996	-0.46	-0.76	-0.80	-0.95	-1.19	-0.87	-0.99	-0.92	-1.04
Switzerland	1999	-0.46	-0.76	-0.80	-0.95	-1.19	-0.87	-0.99	-0.92	-1.04
Belgium	1996	-0.46	-0.76	-0.80	-0.95	-1.20	-0.87	-0.99	-0.92	-1.04
Belgium	1993	-0.47	-0.76	-0.80	-0.95	-1.20	-0.87	-0.99	-0.92	-1.04
Japan	1993	-0.47	-0.76	-0.80	-0.95	-1.20	-0.87	-0.99	-0.92	-1.04
Cyprus	1999	-0.47	-0.76	-0.80	-0.95	-1.20	-0.87	-0.99	-0.92	-1.04
Luxembourg	1990	-0.47	-0.76	-0.80	-0.95	-1.20	-0.87	-0.99	-0.92	-1.04
Germany	1996	-0.47	-0.76	-0.80	-0.95	-1.20	-0.87	-0.99	-0.92	-1.04
Canada	1996	-0.47	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
Germany	1993	-0.47	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
Canada	1993	-0.47	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
Australia	1996	-0.48	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
France	1993	-0.48	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
Iceland	1996	-0.48	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
Switzerland	1990	-0.48	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04

Note: Countries were sorted by real income per capita.

Table 5.5. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	-0.48	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
Netherlands	1996	-0.48	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.04
Italy	1993	-0.48	-0.76	-0.80	-0.95	-1.21	-0.87	-1.00	-0.92	-1.05
Netherlands	1993	-0.48	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
Austria	1993	-0.48	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
Iceland	1999	-0.48	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
Austria	1996	-0.49	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
Italy	1999	-0.49	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
Italy	1996	-0.49	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
Denmark	1996	-0.49	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
France	1996	-0.49	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.92	-1.05
Australia	1993	-0.49	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.93	-1.05
Italy	1990	-0.50	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Iceland	1993	-0.50	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Germany	1990	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
France	1990	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Canada	1999	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Canada	1985	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
United Kingdom	1996	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Denmark	1999	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
United Kingdom	1993	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Denmark	1993	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Germany	1999	-0.50	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Australia	1999	-0.51	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Norway	1996	-0.51	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05

Note: Countries were sorted by real income per capita.

Table 5.5. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	-0.51	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Norway	1999	-0.51	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
Canada	1990	-0.51	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
New Zealand	1996	-0.51	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
Belgium	1990	-0.51	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
Norway	1993	-0.51	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
France	1999	-0.51	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
Belgium	1999	-0.51	-0.76	-0.80	-0.95	-1.25	-0.87	-1.01	-0.93	-1.06
Japan	1990	-0.51	-0.76	-0.80	-0.95	-1.26	-0.87	-1.01	-0.93	-1.06
Netherlands	1999	-0.52	-0.76	-0.80	-0.95	-1.26	-0.87	-1.01	-0.93	-1.06
Austria	1990	-0.52	-0.76	-0.80	-0.95	-1.26	-0.87	-1.01	-0.93	-1.06
New Zealand	1993	-0.52	-0.76	-0.80	-0.95	-1.26	-0.87	-1.01	-0.93	-1.06
Iceland	1990	-0.52	-0.76	-0.80	-0.95	-1.26	-0.87	-1.01	-0.93	-1.06
United Kingdom	1990	-0.52	-0.76	-0.80	-0.95	-1.27	-0.87	-1.01	-0.93	-1.06
Denmark	1990	-0.52	-0.76	-0.80	-0.95	-1.27	-0.87	-1.01	-0.93	-1.06
Netherlands	1990	-0.53	-0.76	-0.80	-0.95	-1.27	-0.87	-1.01	-0.93	-1.06
Luxembourg	1985	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.06
Spain	1996	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.06
Japan	1999	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.07
Israel	1996	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.07
Australia	1990	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.07
Sweden	1996	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.07
Sweden	1993	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.07
Spain	1999	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.07
Ireland	1999	-0.53	-0.76	-0.80	-0.96	-1.28	-0.87	-1.01	-0.93	-1.07

Note: Countries were sorted by real income per capita.

Table 5.5. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	-0.53	-0.76	-0.80	-0.96	-1.29	-0.87	-1.01	-0.93	-1.07
Sweden	1990	-0.54	-0.76	-0.80	-0.96	-1.29	-0.87	-1.01	-0.93	-1.07
France	1985	-0.54	-0.76	-0.80	-0.96	-1.29	-0.87	-1.01	-0.93	-1.07
Ireland	1996	-0.54	-0.76	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Germany	1985	-0.54	-0.76	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Sweden	1999	-0.54	-0.76	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Finland	1996	-0.54	-0.76	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Portugal	1996	-0.54	-0.76	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Spain	1993	-0.54	-0.76	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Greece	1999	-0.54	-0.76	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Portugal	1999	-0.54	-0.77	-0.80	-0.96	-1.30	-0.87	-1.01	-0.93	-1.07
Portugal	1993	-0.54	-0.77	-0.80	-0.96	-1.31	-0.87	-1.01	-0.93	-1.07
Greece	1996	-0.54	-0.77	-0.80	-0.96	-1.31	-0.87	-1.01	-0.93	-1.07
Finland	1993	-0.54	-0.77	-0.80	-0.96	-1.31	-0.87	-1.01	-0.93	-1.07
Italy	1985	-0.54	-0.77	-0.80	-0.96	-1.31	-0.87	-1.01	-0.93	-1.07
Australia	1985	-0.54	-0.77	-0.80	-0.96	-1.31	-0.87	-1.01	-0.93	-1.07
Japan	1985	-0.55	-0.77	-0.80	-0.96	-1.31	-0.87	-1.02	-0.93	-1.07
Belgium	1985	-0.55	-0.77	-0.80	-0.96	-1.31	-0.87	-1.02	-0.93	-1.08
New Zealand	1990	-0.55	-0.77	-0.80	-0.96	-1.31	-0.87	-1.02	-0.93	-1.08
Greece	1993	-0.55	-0.77	-0.80	-0.96	-1.32	-0.87	-1.02	-0.93	-1.08
Netherlands	1985	-0.55	-0.77	-0.80	-0.96	-1.32	-0.87	-1.02	-0.93	-1.08
Finland	1990	-0.55	-0.77	-0.80	-0.96	-1.32	-0.87	-1.02	-0.93	-1.08
Finland	1999	-0.55	-0.77	-0.80	-0.96	-1.33	-0.87	-1.02	-0.93	-1.08
Ireland	1993	-0.55	-0.77	-0.80	-0.96	-1.33	-0.87	-1.02	-0.93	-1.08
Denmark	1985	-0.56	-0.77	-0.80	-0.96	-1.33	-0.87	-1.02	-0.93	-1.08

Note: Countries were sorted by real income per capita.

Table 5.5. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	-0.56	-0.77	-0.80	-0.96	-1.34	-0.87	-1.02	-0.93	-1.08
United Kingdom	1985	-0.56	-0.77	-0.80	-0.96	-1.35	-0.87	-1.02	-0.93	-1.08
Israel	1999	-0.56	-0.77	-0.80	-0.96	-1.35	-0.87	-1.02	-0.93	-1.09
New Zealand	1985	-0.57	-0.77	-0.80	-0.96	-1.36	-0.87	-1.02	-0.93	-1.09
Sweden	1985	-0.57	-0.77	-0.80	-0.96	-1.36	-0.87	-1.02	-0.93	-1.09
Spain	1990	-0.57	-0.77	-0.80	-0.96	-1.36	-0.87	-1.02	-0.93	-1.09
Norway	1985	-0.57	-0.77	-0.80	-0.96	-1.37	-0.87	-1.02	-0.93	-1.09
Austria	1985	-0.57	-0.77	-0.80	-0.96	-1.37	-0.87	-1.02	-0.93	-1.09
Slovenia	1996	-0.57	-0.77	-0.80	-0.96	-1.37	-0.87	-1.02	-0.93	-1.09
Slovenia	1999	-0.58	-0.77	-0.80	-0.97	-1.40	-0.87	-1.03	-0.94	-1.10
Czech Republic	1996	-0.58	-0.77	-0.80	-0.97	-1.41	-0.87	-1.03	-0.94	-1.10
Finland	1985	-0.58	-0.77	-0.80	-0.97	-1.42	-0.87	-1.03	-0.94	-1.10
Spain	1985	-0.59	-0.77	-0.80	-0.97	-1.43	-0.87	-1.03	-0.94	-1.10
Korea	1999	-0.59	-0.77	-0.80	-0.97	-1.43	-0.87	-1.03	-0.94	-1.11
Czech Republic	1999	-0.59	-0.77	-0.80	-0.97	-1.44	-0.87	-1.03	-0.94	-1.11
Portugal	1990	-0.60	-0.77	-0.80	-0.97	-1.47	-0.87	-1.04	-0.94	-1.11
Ireland	1990	-0.60	-0.77	-0.80	-0.97	-1.50	-0.87	-1.04	-0.94	-1.12
Greece	1990	-0.61	-0.77	-0.80	-0.97	-1.52	-0.87	-1.04	-0.94	-1.12
Hungary	1996	-0.62	-0.77	-0.80	-0.98	-1.58	-0.87	-1.05	-0.94	-1.14
Mexico	1996	-0.62	-0.77	-0.80	-0.98	-1.60	-0.87	-1.05	-0.94	-1.14
Estonia	1999	-0.62	-0.77	-0.80	-0.98	-1.61	-0.87	-1.05	-0.94	-1.14
Hungary	1999	-0.62	-0.77	-0.80	-0.98	-1.61	-0.87	-1.05	-0.94	-1.14
Greece	1985	-0.62	-0.77	-0.80	-0.98	-1.62	-0.87	-1.05	-0.94	-1.14
Slovak Republic	1999	-0.62	-0.77	-0.80	-0.98	-1.62	-0.87	-1.05	-0.94	-1.14
Slovak Republic	1996	-0.63	-0.77	-0.80	-0.98	-1.69	-0.87	-1.06	-0.95	-1.15

Note: Countries were sorted by real income per capita.

Table 5.5. Continued

Country	Year	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	-0.63	-0.77	-0.80	-0.98	-1.71	-0.87	-1.06	-0.95	-1.16
Mexico	1999	-0.63	-0.77	-0.80	-0.98	-1.71	-0.87	-1.06	-0.95	-1.16
Poland	1999	-0.63	-0.77	-0.80	-0.98	-1.72	-0.87	-1.06	-0.95	-1.16
Poland	1996	-0.64	-0.77	-0.80	-0.98	-1.74	-0.87	-1.06	-0.95	-1.16
Ireland	1985	-0.64	-0.77	-0.80	-0.98	-1.76	-0.87	-1.07	-0.95	-1.17
Bulgaria	1999	-0.64	-0.77	-0.80	-0.98	-1.77	-0.87	-1.07	-0.95	-1.17
Russian Federation	1996	-0.64	-0.77	-0.80	-0.99	-1.81	-0.87	-1.07	-0.95	-1.17
Croatia	1999	-0.65	-0.77	-0.80	-0.99	-1.87	-0.87	-1.07	-0.95	-1.18
Portugal	1985	-0.65	-0.77	-0.80	-0.99	-1.87	-0.87	-1.07	-0.95	-1.18
Latvia	1999	-0.65	-0.77	-0.80	-0.99	-1.96	-0.87	-1.08	-0.95	-1.19
Turkey	1999	-0.66	-0.77	-0.80	-0.99	-2.06	-0.87	-1.09	-0.95	-1.20
Macedonia	1999	-0.66	-0.77	-0.80	-0.99	-2.09	-0.87	-1.09	-0.95	-1.21
Russian Federation	1999	-0.69	-0.77	-0.80	-1.01	-3.14	-0.87	-1.12	-0.96	-1.28
Romania	1999	-0.69	-0.77	-0.80	-1.01	-3.21	-0.87	-1.12	-0.96	-1.28
Ukraine	1999	-0.71	-0.77	-0.80	-1.02	-8.19	-0.87	-1.15	-0.97	-1.36
Average		-0.53	-0.76	-0.80	-0.96	-1.41	-0.87	-1.02	-0.93	-1.08

Note: Countries were sorted by real income per capita.

Table 5.6. Pooled estimates for 10 broad consumption groups

Parameters	Consumption categories		
Income flexibility (ϕ)		-0.778^{*}	(0.027)
Beta (β)	Food	-0.104^{*}	(0.007)
	Beverages and tobacco	-0.013^{*}	(0.003)
	Clothing and footwear	-0.003	(0.003)
	Gross rent, fuel, and power	-0.006	(0.009)
	House furnishings and operations	0.014^{*}	(0.002)
	Medical care	0.037^{*}	(0.007)
	Transport and communications	0.012^{*}	(0.004)
	Recreation	0.022^{*}	(0.003)
	Education	0.015^{*}	(0.006)
	Other expenditures	0.026^{*}	(0.004)
Alpha (α)	Food	0.154^{*}	(0.006)
	Beverages and tobacco	0.045^{*}	(0.003)
	Clothing and footwear	0.061^{*}	(0.002)
	Gross rent, fuel, and power	0.179^{*}	(0.007)
	House furnishings and operations	0.075^{*}	(0.002)
	Medical care	0.076^{*}	(0.006)
	Transport and communications	0.149^{*}	(0.004)
	Recreation	0.088^{*}	(0.003)
	Education	0.089^{*}	(0.004)
	Other expenditures	0.085^{*}	(0.004)
Autoregressive (τ)		0.396^{*}	(0.022)

Note: Asymptotic standard errors of the associated parameters are shown in parentheses and * denotes statistically significant at the 5% level.

Table 5.7. Income elasticities for 10 broad consumption group, pooled data

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	0.30	0.69	0.95	0.97	1.19	1.47	1.08	1.25	1.17	1.30
Luxembourg	1993	0.30	0.69	0.95	0.97	1.19	1.47	1.08	1.25	1.17	1.30
United States	1996	0.30	0.69	0.95	0.97	1.19	1.47	1.08	1.25	1.17	1.30
Luxembourg	1996	0.31	0.70	0.95	0.97	1.19	1.47	1.08	1.25	1.17	1.30
United States	1993	0.32	0.70	0.95	0.97	1.19	1.48	1.08	1.25	1.17	1.30
United States	1999	0.33	0.70	0.95	0.97	1.19	1.48	1.08	1.25	1.17	1.31
Switzerland	1993	0.40	0.71	0.95	0.97	1.20	1.53	1.08	1.26	1.18	1.32
United States	1990	0.40	0.72	0.95	0.97	1.20	1.53	1.08	1.26	1.18	1.32
Switzerland	1996	0.41	0.72	0.95	0.97	1.20	1.53	1.08	1.26	1.18	1.33
United States	1985	0.41	0.72	0.95	0.97	1.20	1.54	1.08	1.26	1.18	1.33
Japan	1996	0.42	0.72	0.95	0.97	1.20	1.55	1.08	1.27	1.18	1.33
Switzerland	1999	0.42	0.72	0.95	0.97	1.20	1.55	1.08	1.27	1.18	1.33
Belgium	1996	0.43	0.72	0.95	0.97	1.20	1.55	1.08	1.27	1.18	1.33
Belgium	1993	0.43	0.72	0.95	0.97	1.20	1.56	1.08	1.27	1.18	1.33
Japan	1993	0.43	0.72	0.95	0.97	1.20	1.56	1.08	1.27	1.18	1.33
Cyprus	1999	0.44	0.72	0.95	0.97	1.20	1.56	1.08	1.27	1.18	1.33
Luxembourg	1990	0.44	0.72	0.95	0.97	1.20	1.56	1.08	1.27	1.18	1.33
Germany	1996	0.44	0.72	0.95	0.97	1.20	1.56	1.08	1.27	1.18	1.34
Canada	1996	0.44	0.73	0.95	0.97	1.20	1.57	1.08	1.27	1.18	1.34
Germany	1993	0.44	0.73	0.95	0.97	1.20	1.57	1.08	1.27	1.18	1.34
Canada	1993	0.44	0.73	0.95	0.97	1.20	1.57	1.08	1.27	1.18	1.34
Australia	1996	0.45	0.73	0.95	0.97	1.20	1.57	1.08	1.27	1.18	1.34
France	1993	0.45	0.73	0.95	0.97	1.20	1.57	1.08	1.27	1.18	1.34
Iceland	1996	0.45	0.73	0.95	0.97	1.21	1.57	1.08	1.27	1.18	1.34
Switzerland	1990	0.45	0.73	0.95	0.97	1.21	1.58	1.08	1.27	1.18	1.34

Note: Countries were sorted by real income per capita.

Table 5.7. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	0.45	0.73	0.95	0.97	1.21	1.58	1.08	1.27	1.18	1.34
Netherlands	1996	0.45	0.73	0.95	0.97	1.21	1.58	1.08	1.27	1.18	1.34
Italy	1993	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.27	1.18	1.34
Netherlands	1993	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.27	1.18	1.34
Austria	1993	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.27	1.18	1.34
Iceland	1999	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.27	1.18	1.34
Austria	1996	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.28	1.18	1.34
Italy	1999	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.28	1.18	1.34
Italy	1996	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.28	1.18	1.34
Denmark	1996	0.46	0.73	0.95	0.97	1.21	1.58	1.08	1.28	1.18	1.34
France	1996	0.46	0.73	0.95	0.97	1.21	1.59	1.08	1.28	1.18	1.35
Australia	1993	0.47	0.73	0.95	0.97	1.21	1.59	1.08	1.28	1.18	1.35
Italy	1990	0.48	0.73	0.95	0.97	1.21	1.60	1.08	1.28	1.18	1.35
Iceland	1993	0.48	0.73	0.95	0.97	1.21	1.60	1.08	1.28	1.18	1.35
Germany	1990	0.48	0.73	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
France	1990	0.48	0.73	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
Canada	1999	0.48	0.73	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
Canada	1985	0.48	0.73	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
United Kingdom	1996	0.48	0.73	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
Denmark	1999	0.48	0.74	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
United Kingdom	1993	0.48	0.74	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
Denmark	1993	0.48	0.74	0.95	0.97	1.21	1.61	1.08	1.28	1.18	1.35
Germany	1999	0.48	0.74	0.95	0.97	1.21	1.62	1.08	1.28	1.18	1.35
Australia	1999	0.49	0.74	0.95	0.97	1.21	1.62	1.08	1.28	1.18	1.36
Norway	1996	0.49	0.74	0.95	0.97	1.21	1.62	1.08	1.28	1.18	1.36

Note: Countries were sorted by real income per capita.

Table 5.7. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	0.49	0.74	0.95	0.97	1.21	1.62	1.08	1.28	1.18	1.36
Norway	1999	0.49	0.74	0.95	0.97	1.21	1.62	1.08	1.28	1.18	1.36
Canada	1990	0.49	0.74	0.95	0.97	1.21	1.62	1.08	1.28	1.18	1.36
New Zealand	1996	0.49	0.74	0.95	0.97	1.21	1.62	1.08	1.28	1.18	1.36
Belgium	1990	0.49	0.74	0.95	0.97	1.21	1.63	1.08	1.28	1.18	1.36
Norway	1993	0.49	0.74	0.95	0.97	1.21	1.63	1.08	1.28	1.19	1.36
France	1999	0.49	0.74	0.95	0.97	1.21	1.63	1.08	1.29	1.19	1.36
Belgium	1999	0.50	0.74	0.95	0.97	1.21	1.63	1.08	1.29	1.19	1.36
Japan	1990	0.50	0.74	0.95	0.97	1.21	1.63	1.08	1.29	1.19	1.36
Netherlands	1999	0.50	0.74	0.95	0.97	1.21	1.64	1.08	1.29	1.19	1.36
Austria	1990	0.50	0.74	0.95	0.97	1.21	1.64	1.08	1.29	1.19	1.36
New Zealand	1993	0.50	0.74	0.95	0.97	1.21	1.64	1.08	1.29	1.19	1.36
Iceland	1990	0.50	0.74	0.95	0.97	1.21	1.65	1.08	1.29	1.19	1.36
United Kingdom	1990	0.51	0.74	0.95	0.97	1.21	1.65	1.08	1.29	1.19	1.37
Denmark	1990	0.51	0.74	0.95	0.97	1.21	1.65	1.08	1.29	1.19	1.37
Netherlands	1990	0.51	0.74	0.95	0.97	1.22	1.66	1.08	1.29	1.19	1.37
Luxembourg	1985	0.51	0.74	0.95	0.97	1.22	1.66	1.08	1.29	1.19	1.37
Spain	1996	0.51	0.74	0.95	0.97	1.22	1.66	1.08	1.29	1.19	1.37
Japan	1999	0.51	0.74	0.95	0.97	1.22	1.66	1.08	1.29	1.19	1.37
Israel	1996	0.51	0.74	0.95	0.97	1.22	1.67	1.08	1.29	1.19	1.37
Australia	1990	0.52	0.74	0.95	0.97	1.22	1.67	1.08	1.29	1.19	1.37
Sweden	1996	0.52	0.74	0.95	0.97	1.22	1.67	1.08	1.29	1.19	1.37
Sweden	1993	0.52	0.74	0.95	0.97	1.22	1.67	1.08	1.29	1.19	1.37
Spain	1999	0.52	0.74	0.95	0.97	1.22	1.67	1.08	1.29	1.19	1.37
Ireland	1999	0.52	0.74	0.95	0.97	1.22	1.67	1.08	1.29	1.19	1.37

Note: Countries were sorted by real income per capita.

Table 5.7. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	0.52	0.75	0.95	0.97	1.22	1.68	1.08	1.29	1.19	1.37
Sweden	1990	0.52	0.75	0.95	0.97	1.22	1.68	1.08	1.30	1.19	1.38
France	1985	0.52	0.75	0.95	0.97	1.22	1.69	1.08	1.30	1.19	1.38
Ireland	1996	0.53	0.75	0.95	0.97	1.22	1.69	1.08	1.30	1.19	1.38
Germany	1985	0.53	0.75	0.95	0.97	1.22	1.69	1.08	1.30	1.19	1.38
Sweden	1999	0.53	0.75	0.95	0.97	1.22	1.69	1.08	1.30	1.19	1.38
Finland	1996	0.53	0.75	0.95	0.97	1.22	1.69	1.08	1.30	1.19	1.38
Portugal	1996	0.53	0.75	0.95	0.97	1.22	1.69	1.08	1.30	1.19	1.38
Spain	1993	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Greece	1999	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Portugal	1999	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Portugal	1993	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Greece	1996	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Finland	1993	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Italy	1985	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Australia	1985	0.53	0.75	0.95	0.97	1.22	1.70	1.08	1.30	1.19	1.38
Japan	1985	0.54	0.75	0.95	0.97	1.22	1.71	1.08	1.30	1.19	1.38
Belgium	1985	0.54	0.75	0.95	0.97	1.22	1.71	1.08	1.30	1.19	1.38
New Zealand	1990	0.54	0.75	0.95	0.97	1.22	1.71	1.08	1.30	1.19	1.38
Greece	1993	0.54	0.75	0.95	0.97	1.22	1.72	1.08	1.30	1.19	1.39
Netherlands	1985	0.54	0.75	0.95	0.97	1.22	1.72	1.08	1.30	1.19	1.39
Finland	1990	0.54	0.75	0.95	0.97	1.22	1.73	1.08	1.30	1.19	1.39
Finland	1999	0.54	0.75	0.95	0.97	1.22	1.73	1.08	1.30	1.19	1.39
Ireland	1993	0.54	0.75	0.95	0.97	1.22	1.73	1.08	1.30	1.19	1.39
Denmark	1985	0.55	0.75	0.95	0.97	1.22	1.74	1.08	1.31	1.19	1.39

Note: Countries were sorted by real income per capita.

Table 5.7. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	0.55	0.75	0.95	0.97	1.22	1.74	1.08	1.31	1.19	1.39
United Kingdom	1985	0.55	0.76	0.95	0.97	1.22	1.76	1.08	1.31	1.19	1.40
Israel	1999	0.55	0.76	0.95	0.97	1.22	1.76	1.08	1.31	1.20	1.40
New Zealand	1985	0.56	0.76	0.95	0.97	1.23	1.77	1.08	1.31	1.20	1.40
Sweden	1985	0.56	0.76	0.95	0.97	1.23	1.78	1.08	1.31	1.20	1.40
Spain	1990	0.56	0.76	0.95	0.97	1.23	1.78	1.08	1.31	1.20	1.40
Norway	1985	0.56	0.76	0.95	0.97	1.23	1.78	1.08	1.31	1.20	1.40
Austria	1985	0.56	0.76	0.95	0.97	1.23	1.78	1.08	1.31	1.20	1.40
Slovenia	1996	0.56	0.76	0.95	0.97	1.23	1.79	1.09	1.31	1.20	1.41
Slovenia	1999	0.57	0.76	0.95	0.97	1.23	1.82	1.09	1.32	1.20	1.41
Czech Republic	1996	0.58	0.76	0.95	0.97	1.23	1.85	1.09	1.32	1.20	1.42
Finland	1985	0.58	0.76	0.95	0.97	1.23	1.85	1.09	1.32	1.20	1.42
Spain	1985	0.58	0.76	0.95	0.97	1.23	1.86	1.09	1.32	1.20	1.42
Korea	1999	0.59	0.77	0.95	0.97	1.23	1.87	1.09	1.33	1.20	1.43
Czech Republic	1999	0.59	0.77	0.96	0.97	1.23	1.88	1.09	1.33	1.20	1.43
Portugal	1990	0.60	0.77	0.96	0.97	1.24	1.91	1.09	1.33	1.20	1.44
Ireland	1990	0.60	0.77	0.96	0.97	1.24	1.97	1.09	1.34	1.21	1.45
Greece	1990	0.61	0.77	0.96	0.97	1.24	1.99	1.09	1.34	1.21	1.45
Hungary	1996	0.62	0.78	0.96	0.97	1.25	2.06	1.09	1.35	1.21	1.47
Mexico	1996	0.62	0.78	0.96	0.97	1.25	2.09	1.09	1.35	1.21	1.47
Estonia	1999	0.62	0.78	0.96	0.97	1.25	2.10	1.09	1.35	1.21	1.47
Hungary	1999	0.62	0.78	0.96	0.97	1.25	2.10	1.09	1.35	1.21	1.48
Greece	1985	0.63	0.78	0.96	0.97	1.25	2.12	1.09	1.35	1.21	1.48
Slovak Republic	1999	0.63	0.78	0.96	0.97	1.25	2.12	1.09	1.36	1.21	1.48
Slovak Republic	1996	0.63	0.78	0.96	0.97	1.25	2.20	1.09	1.36	1.22	1.49

Note: Countries were sorted by real income per capita.

Table 5.7. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	0.64	0.78	0.96	0.97	1.25	2.23	1.09	1.37	1.22	1.50
Mexico	1999	0.64	0.78	0.96	0.97	1.25	2.23	1.09	1.37	1.22	1.50
Poland	1999	0.64	0.78	0.96	0.97	1.25	2.25	1.09	1.37	1.22	1.50
Poland	1996	0.64	0.78	0.96	0.97	1.26	2.27	1.09	1.37	1.22	1.50
Ireland	1985	0.64	0.78	0.96	0.97	1.26	2.31	1.09	1.37	1.22	1.51
Bulgaria	1999	0.64	0.78	0.96	0.97	1.26	2.31	1.09	1.37	1.22	1.51
Russian Federation	1996	0.65	0.79	0.96	0.97	1.26	2.37	1.09	1.38	1.22	1.52
Croatia	1999	0.65	0.79	0.96	0.97	1.26	2.44	1.09	1.38	1.22	1.53
Portugal	1985	0.65	0.79	0.96	0.97	1.26	2.45	1.09	1.38	1.22	1.53
Latvia	1999	0.66	0.79	0.96	0.97	1.27	2.56	1.09	1.39	1.22	1.54
Turkey	1999	0.66	0.79	0.96	0.97	1.27	2.69	1.09	1.40	1.23	1.56
Macedonia	1999	0.67	0.79	0.96	0.97	1.27	2.73	1.09	1.40	1.23	1.56
Russian Federation	1999	0.69	0.80	0.96	0.97	1.29	4.07	1.09	1.44	1.24	1.66
Romania	1999	0.69	0.80	0.96	0.97	1.29	4.15	1.09	1.45	1.24	1.66
Ukraine	1999	0.71	0.81	0.96	0.97	1.31	10.12	1.09	1.49	1.26	1.77
Average		0.52	0.75	0.95	0.97	1.22	1.84	1.08	1.30	1.19	1.39

Note: Countries were sorted by real income per capita.

Table 5.8. Frisch own-price elasticities for 10 broad consumption group, pooled data

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	-0.23	-0.54	-0.74	-0.75	-0.93	-1.14	-0.84	-0.97	-0.91	-1.01
Luxembourg	1993	-0.24	-0.54	-0.74	-0.75	-0.93	-1.14	-0.84	-0.97	-0.91	-1.01
United States	1996	-0.24	-0.54	-0.74	-0.75	-0.93	-1.14	-0.84	-0.97	-0.91	-1.01
Luxembourg	1996	-0.24	-0.54	-0.74	-0.75	-0.93	-1.15	-0.84	-0.97	-0.91	-1.01
United States	1993	-0.25	-0.54	-0.74	-0.75	-0.93	-1.15	-0.84	-0.97	-0.91	-1.01
United States	1999	-0.25	-0.54	-0.74	-0.75	-0.93	-1.15	-0.84	-0.97	-0.91	-1.02
Switzerland	1993	-0.31	-0.56	-0.74	-0.75	-0.93	-1.19	-0.84	-0.98	-0.91	-1.03
United States	1990	-0.31	-0.56	-0.74	-0.75	-0.93	-1.19	-0.84	-0.98	-0.91	-1.03
Switzerland	1996	-0.32	-0.56	-0.74	-0.75	-0.93	-1.19	-0.84	-0.98	-0.91	-1.03
United States	1985	-0.32	-0.56	-0.74	-0.75	-0.93	-1.20	-0.84	-0.98	-0.92	-1.03
Japan	1996	-0.33	-0.56	-0.74	-0.75	-0.93	-1.20	-0.84	-0.99	-0.92	-1.04
Switzerland	1999	-0.33	-0.56	-0.74	-0.75	-0.93	-1.20	-0.84	-0.99	-0.92	-1.04
Belgium	1996	-0.33	-0.56	-0.74	-0.75	-0.94	-1.21	-0.84	-0.99	-0.92	-1.04
Belgium	1993	-0.34	-0.56	-0.74	-0.75	-0.94	-1.21	-0.84	-0.99	-0.92	-1.04
Japan	1993	-0.34	-0.56	-0.74	-0.75	-0.94	-1.21	-0.84	-0.99	-0.92	-1.04
Cyprus	1999	-0.34	-0.56	-0.74	-0.75	-0.94	-1.21	-0.84	-0.99	-0.92	-1.04
Luxembourg	1990	-0.34	-0.56	-0.74	-0.75	-0.94	-1.21	-0.84	-0.99	-0.92	-1.04
Germany	1996	-0.34	-0.56	-0.74	-0.75	-0.94	-1.21	-0.84	-0.99	-0.92	-1.04
Canada	1996	-0.35	-0.56	-0.74	-0.75	-0.94	-1.22	-0.84	-0.99	-0.92	-1.04
Germany	1993	-0.35	-0.56	-0.74	-0.75	-0.94	-1.22	-0.84	-0.99	-0.92	-1.04
Canada	1993	-0.35	-0.56	-0.74	-0.75	-0.94	-1.22	-0.84	-0.99	-0.92	-1.04
Australia	1996	-0.35	-0.56	-0.74	-0.75	-0.94	-1.22	-0.84	-0.99	-0.92	-1.04
France	1993	-0.35	-0.56	-0.74	-0.75	-0.94	-1.22	-0.84	-0.99	-0.92	-1.04
Iceland	1996	-0.35	-0.57	-0.74	-0.75	-0.94	-1.22	-0.84	-0.99	-0.92	-1.04
Switzerland	1990	-0.35	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.04

Note: Countries were sorted by real income per capita.

Table 5.8. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	-0.35	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.04
Netherlands	1996	-0.35	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.04
Italy	1993	-0.35	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.04
Netherlands	1993	-0.36	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.04
Austria	1993	-0.36	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.04
Iceland	1999	-0.36	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.04
Austria	1996	-0.36	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.05
Italy	1999	-0.36	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.05
Italy	1996	-0.36	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.05
Denmark	1996	-0.36	-0.57	-0.74	-0.75	-0.94	-1.23	-0.84	-0.99	-0.92	-1.05
France	1996	-0.36	-0.57	-0.74	-0.75	-0.94	-1.24	-0.84	-0.99	-0.92	-1.05
Australia	1993	-0.36	-0.57	-0.74	-0.75	-0.94	-1.24	-0.84	-0.99	-0.92	-1.05
Italy	1990	-0.37	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
Iceland	1993	-0.37	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
Germany	1990	-0.37	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
France	1990	-0.37	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
Canada	1999	-0.37	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
Canada	1985	-0.37	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
United Kingdom	1996	-0.37	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
Denmark	1999	-0.38	-0.57	-0.74	-0.75	-0.94	-1.25	-0.84	-1.00	-0.92	-1.05
United Kingdom	1993	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.05
Denmark	1993	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.05
Germany	1999	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.05
Australia	1999	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.05
Norway	1996	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.05

Note: Countries were sorted by real income per capita.

Table 5.8. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.05
Norway	1999	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.05
Canada	1990	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.06
New Zealand	1996	-0.38	-0.57	-0.74	-0.75	-0.94	-1.26	-0.84	-1.00	-0.92	-1.06
Belgium	1990	-0.38	-0.57	-0.74	-0.75	-0.94	-1.27	-0.84	-1.00	-0.92	-1.06
Norway	1993	-0.38	-0.57	-0.74	-0.75	-0.94	-1.27	-0.84	-1.00	-0.92	-1.06
France	1999	-0.38	-0.57	-0.74	-0.75	-0.94	-1.27	-0.84	-1.00	-0.92	-1.06
Belgium	1999	-0.39	-0.57	-0.74	-0.75	-0.94	-1.27	-0.84	-1.00	-0.92	-1.06
Japan	1990	-0.39	-0.57	-0.74	-0.75	-0.94	-1.27	-0.84	-1.00	-0.92	-1.06
Netherlands	1999	-0.39	-0.58	-0.74	-0.75	-0.94	-1.28	-0.84	-1.00	-0.92	-1.06
Austria	1990	-0.39	-0.58	-0.74	-0.75	-0.94	-1.28	-0.84	-1.00	-0.92	-1.06
New Zealand	1993	-0.39	-0.58	-0.74	-0.75	-0.94	-1.28	-0.84	-1.00	-0.92	-1.06
Iceland	1990	-0.39	-0.58	-0.74	-0.75	-0.94	-1.28	-0.84	-1.00	-0.92	-1.06
United Kingdom	1990	-0.39	-0.58	-0.74	-0.75	-0.94	-1.28	-0.84	-1.00	-0.92	-1.06
Denmark	1990	-0.40	-0.58	-0.74	-0.75	-0.94	-1.29	-0.84	-1.00	-0.92	-1.06
Netherlands	1990	-0.40	-0.58	-0.74	-0.75	-0.95	-1.29	-0.84	-1.00	-0.92	-1.06
Luxembourg	1985	-0.40	-0.58	-0.74	-0.75	-0.95	-1.29	-0.84	-1.00	-0.92	-1.07
Spain	1996	-0.40	-0.58	-0.74	-0.75	-0.95	-1.29	-0.84	-1.00	-0.92	-1.07
Japan	1999	-0.40	-0.58	-0.74	-0.75	-0.95	-1.29	-0.84	-1.00	-0.92	-1.07
Israel	1996	-0.40	-0.58	-0.74	-0.75	-0.95	-1.30	-0.84	-1.01	-0.92	-1.07
Australia	1990	-0.40	-0.58	-0.74	-0.75	-0.95	-1.30	-0.84	-1.01	-0.92	-1.07
Sweden	1996	-0.40	-0.58	-0.74	-0.75	-0.95	-1.30	-0.84	-1.01	-0.92	-1.07
Sweden	1993	-0.40	-0.58	-0.74	-0.75	-0.95	-1.30	-0.84	-1.01	-0.92	-1.07
Spain	1999	-0.40	-0.58	-0.74	-0.75	-0.95	-1.30	-0.84	-1.01	-0.92	-1.07
Ireland	1999	-0.40	-0.58	-0.74	-0.75	-0.95	-1.30	-0.84	-1.01	-0.92	-1.07

Note: Countries were sorted by real income per capita.

Table 5.8. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	-0.41	-0.58	-0.74	-0.75	-0.95	-1.31	-0.84	-1.01	-0.93	-1.07
Sweden	1990	-0.41	-0.58	-0.74	-0.75	-0.95	-1.31	-0.84	-1.01	-0.93	-1.07
France	1985	-0.41	-0.58	-0.74	-0.75	-0.95	-1.31	-0.84	-1.01	-0.93	-1.07
Ireland	1996	-0.41	-0.58	-0.74	-0.75	-0.95	-1.31	-0.84	-1.01	-0.93	-1.07
Germany	1985	-0.41	-0.58	-0.74	-0.75	-0.95	-1.31	-0.84	-1.01	-0.93	-1.07
Sweden	1999	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Finland	1996	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Portugal	1996	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Spain	1993	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Greece	1999	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Portugal	1999	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Portugal	1993	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Greece	1996	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.07
Finland	1993	-0.41	-0.58	-0.74	-0.75	-0.95	-1.32	-0.84	-1.01	-0.93	-1.08
Italy	1985	-0.42	-0.58	-0.74	-0.75	-0.95	-1.33	-0.84	-1.01	-0.93	-1.08
Australia	1985	-0.42	-0.58	-0.74	-0.75	-0.95	-1.33	-0.84	-1.01	-0.93	-1.08
Japan	1985	-0.42	-0.58	-0.74	-0.75	-0.95	-1.33	-0.84	-1.01	-0.93	-1.08
Belgium	1985	-0.42	-0.58	-0.74	-0.75	-0.95	-1.33	-0.84	-1.01	-0.93	-1.08
New Zealand	1990	-0.42	-0.58	-0.74	-0.75	-0.95	-1.33	-0.84	-1.01	-0.93	-1.08
Greece	1993	-0.42	-0.58	-0.74	-0.75	-0.95	-1.34	-0.84	-1.01	-0.93	-1.08
Netherlands	1985	-0.42	-0.58	-0.74	-0.75	-0.95	-1.34	-0.84	-1.01	-0.93	-1.08
Finland	1990	-0.42	-0.58	-0.74	-0.75	-0.95	-1.34	-0.84	-1.01	-0.93	-1.08
Finland	1999	-0.42	-0.59	-0.74	-0.75	-0.95	-1.34	-0.84	-1.01	-0.93	-1.08
Ireland	1993	-0.42	-0.59	-0.74	-0.75	-0.95	-1.34	-0.84	-1.01	-0.93	-1.08
Denmark	1985	-0.43	-0.59	-0.74	-0.75	-0.95	-1.35	-0.84	-1.02	-0.93	-1.08

Note: Countries were sorted by real income per capita.

Table 5.8. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	-0.43	-0.59	-0.74	-0.75	-0.95	-1.36	-0.84	-1.02	-0.93	-1.08
United Kingdom	1985	-0.43	-0.59	-0.74	-0.75	-0.95	-1.37	-0.84	-1.02	-0.93	-1.09
Israel	1999	-0.43	-0.59	-0.74	-0.75	-0.95	-1.37	-0.84	-1.02	-0.93	-1.09
New Zealand	1985	-0.44	-0.59	-0.74	-0.75	-0.95	-1.38	-0.84	-1.02	-0.93	-1.09
Sweden	1985	-0.44	-0.59	-0.74	-0.75	-0.95	-1.38	-0.84	-1.02	-0.93	-1.09
Spain	1990	-0.44	-0.59	-0.74	-0.75	-0.95	-1.38	-0.84	-1.02	-0.93	-1.09
Norway	1985	-0.44	-0.59	-0.74	-0.75	-0.95	-1.39	-0.84	-1.02	-0.93	-1.09
Austria	1985	-0.44	-0.59	-0.74	-0.75	-0.95	-1.39	-0.84	-1.02	-0.93	-1.09
Slovenia	1996	-0.44	-0.59	-0.74	-0.75	-0.95	-1.39	-0.84	-1.02	-0.93	-1.09
Slovenia	1999	-0.45	-0.59	-0.74	-0.75	-0.96	-1.42	-0.84	-1.03	-0.93	-1.10
Czech Republic	1996	-0.45	-0.59	-0.74	-0.75	-0.96	-1.44	-0.84	-1.03	-0.93	-1.10
Finland	1985	-0.45	-0.59	-0.74	-0.75	-0.96	-1.44	-0.84	-1.03	-0.93	-1.11
Spain	1985	-0.45	-0.59	-0.74	-0.75	-0.96	-1.45	-0.84	-1.03	-0.93	-1.11
Korea	1999	-0.46	-0.60	-0.74	-0.75	-0.96	-1.46	-0.84	-1.03	-0.93	-1.11
Czech Republic	1999	-0.46	-0.60	-0.74	-0.75	-0.96	-1.47	-0.84	-1.03	-0.94	-1.11
Portugal	1990	-0.46	-0.60	-0.74	-0.75	-0.96	-1.49	-0.85	-1.04	-0.94	-1.12
Ireland	1990	-0.47	-0.60	-0.74	-0.75	-0.96	-1.53	-0.85	-1.04	-0.94	-1.13
Greece	1990	-0.47	-0.60	-0.74	-0.75	-0.97	-1.55	-0.85	-1.04	-0.94	-1.13
Hungary	1996	-0.48	-0.60	-0.74	-0.75	-0.97	-1.61	-0.85	-1.05	-0.94	-1.14
Mexico	1996	-0.48	-0.60	-0.74	-0.75	-0.97	-1.63	-0.85	-1.05	-0.94	-1.15
Estonia	1999	-0.48	-0.61	-0.74	-0.75	-0.97	-1.63	-0.85	-1.05	-0.94	-1.15
Hungary	1999	-0.49	-0.61	-0.74	-0.75	-0.97	-1.64	-0.85	-1.05	-0.94	-1.15
Greece	1985	-0.49	-0.61	-0.74	-0.75	-0.97	-1.65	-0.85	-1.05	-0.94	-1.15
Slovak Republic	1999	-0.49	-0.61	-0.74	-0.75	-0.97	-1.65	-0.85	-1.05	-0.94	-1.15
Slovak Republic	1996	-0.49	-0.61	-0.74	-0.75	-0.97	-1.71	-0.85	-1.06	-0.95	-1.16

Note: Countries were sorted by real income per capita.

Table 5.8. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	-0.50	-0.61	-0.74	-0.75	-0.98	-1.74	-0.85	-1.06	-0.95	-1.17
Mexico	1999	-0.50	-0.61	-0.74	-0.75	-0.98	-1.74	-0.85	-1.06	-0.95	-1.17
Poland	1999	-0.50	-0.61	-0.74	-0.75	-0.98	-1.75	-0.85	-1.06	-0.95	-1.17
Poland	1996	-0.50	-0.61	-0.74	-0.75	-0.98	-1.77	-0.85	-1.07	-0.95	-1.17
Ireland	1985	-0.50	-0.61	-0.74	-0.75	-0.98	-1.79	-0.85	-1.07	-0.95	-1.17
Bulgaria	1999	-0.50	-0.61	-0.74	-0.75	-0.98	-1.80	-0.85	-1.07	-0.95	-1.17
Russian Federation	1996	-0.50	-0.61	-0.74	-0.75	-0.98	-1.84	-0.85	-1.07	-0.95	-1.18
Croatia	1999	-0.51	-0.61	-0.74	-0.75	-0.98	-1.90	-0.85	-1.08	-0.95	-1.19
Portugal	1985	-0.51	-0.61	-0.74	-0.75	-0.98	-1.91	-0.85	-1.08	-0.95	-1.19
Latvia	1999	-0.51	-0.61	-0.74	-0.75	-0.98	-1.99	-0.85	-1.08	-0.95	-1.20
Turkey	1999	-0.52	-0.62	-0.74	-0.75	-0.99	-2.10	-0.85	-1.09	-0.95	-1.21
Macedonia	1999	-0.52	-0.62	-0.74	-0.75	-0.99	-2.13	-0.85	-1.09	-0.96	-1.22
Russian Federation	1999	-0.54	-0.62	-0.74	-0.75	-1.00	-3.16	-0.85	-1.12	-0.97	-1.29
Romania	1999	-0.54	-0.63	-0.74	-0.75	-1.00	-3.23	-0.85	-1.13	-0.97	-1.29
Ukraine	1999	-0.55	-0.63	-0.74	-0.75	-1.02	-7.87	-0.85	-1.16	-0.98	-1.37
Average		-0.40	-0.58	-0.74	-0.75	-0.95	-1.43	-0.84	-1.01	-0.93	-1.08

Note: Countries were sorted by real income per capita.

Table 5.9. Slutsky own-price elasticities for 10 broad consumption group, pooled data

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	-0.22	-0.52	-0.70	-0.62	-0.84	-1.01	-0.70	-0.86	-0.81	-0.90
Luxembourg	1993	-0.22	-0.52	-0.70	-0.62	-0.84	-1.01	-0.70	-0.86	-0.81	-0.90
United States	1996	-0.22	-0.52	-0.70	-0.62	-0.84	-1.01	-0.70	-0.86	-0.81	-0.90
Luxembourg	1996	-0.23	-0.52	-0.70	-0.62	-0.84	-1.01	-0.70	-0.86	-0.81	-0.90
United States	1993	-0.24	-0.53	-0.70	-0.62	-0.84	-1.02	-0.70	-0.87	-0.82	-0.90
United States	1999	-0.24	-0.53	-0.70	-0.62	-0.84	-1.02	-0.70	-0.87	-0.82	-0.90
Switzerland	1993	-0.29	-0.54	-0.70	-0.62	-0.85	-1.06	-0.71	-0.88	-0.82	-0.92
United States	1990	-0.29	-0.54	-0.70	-0.62	-0.85	-1.06	-0.71	-0.88	-0.82	-0.92
Switzerland	1996	-0.30	-0.54	-0.70	-0.62	-0.85	-1.07	-0.71	-0.88	-0.82	-0.92
United States	1985	-0.30	-0.54	-0.70	-0.62	-0.85	-1.07	-0.71	-0.88	-0.82	-0.92
Japan	1996	-0.30	-0.54	-0.70	-0.62	-0.85	-1.08	-0.71	-0.88	-0.82	-0.93
Switzerland	1999	-0.31	-0.54	-0.70	-0.62	-0.85	-1.08	-0.71	-0.88	-0.82	-0.93
Belgium	1996	-0.31	-0.54	-0.70	-0.62	-0.86	-1.08	-0.71	-0.88	-0.83	-0.93
Belgium	1993	-0.31	-0.54	-0.70	-0.62	-0.86	-1.09	-0.71	-0.89	-0.83	-0.93
Japan	1993	-0.31	-0.54	-0.70	-0.62	-0.86	-1.09	-0.71	-0.89	-0.83	-0.93
Cyprus	1999	-0.31	-0.54	-0.70	-0.62	-0.86	-1.09	-0.71	-0.89	-0.83	-0.93
Luxembourg	1990	-0.31	-0.54	-0.70	-0.62	-0.86	-1.09	-0.71	-0.89	-0.83	-0.93
Germany	1996	-0.31	-0.54	-0.70	-0.62	-0.86	-1.09	-0.71	-0.89	-0.83	-0.93
Canada	1996	-0.32	-0.54	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.93
Germany	1993	-0.32	-0.54	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.93
Canada	1993	-0.32	-0.54	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.93
Australia	1996	-0.32	-0.54	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.93
France	1993	-0.32	-0.54	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.93
Iceland	1996	-0.32	-0.55	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Switzerland	1990	-0.32	-0.55	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94

Note: Countries were sorted by real income per capita.

Table 5.9. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	-0.32	-0.55	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Netherlands	1996	-0.32	-0.55	-0.70	-0.62	-0.86	-1.10	-0.71	-0.89	-0.83	-0.94
Italy	1993	-0.32	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Netherlands	1993	-0.32	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Austria	1993	-0.33	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Iceland	1999	-0.33	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Austria	1996	-0.33	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Italy	1999	-0.33	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Italy	1996	-0.33	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Denmark	1996	-0.33	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
France	1996	-0.33	-0.55	-0.70	-0.62	-0.86	-1.11	-0.71	-0.89	-0.83	-0.94
Australia	1993	-0.33	-0.55	-0.70	-0.62	-0.86	-1.12	-0.71	-0.89	-0.83	-0.94
Italy	1990	-0.33	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
Iceland	1993	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
Germany	1990	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
France	1990	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
Canada	1999	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
Canada	1985	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
United Kingdom	1996	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
Denmark	1999	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
United Kingdom	1993	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
Denmark	1993	-0.34	-0.55	-0.70	-0.62	-0.86	-1.13	-0.71	-0.90	-0.83	-0.95
Germany	1999	-0.34	-0.55	-0.70	-0.62	-0.86	-1.14	-0.71	-0.90	-0.83	-0.95
Australia	1999	-0.34	-0.55	-0.70	-0.62	-0.86	-1.14	-0.71	-0.90	-0.83	-0.95
Norway	1996	-0.34	-0.55	-0.70	-0.62	-0.86	-1.14	-0.71	-0.90	-0.83	-0.95

Note: Countries were sorted by real income per capita.

Table 5.9. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	-0.34	-0.55	-0.70	-0.62	-0.86	-1.14	-0.71	-0.90	-0.83	-0.95
Norway	1999	-0.34	-0.55	-0.70	-0.62	-0.86	-1.14	-0.71	-0.90	-0.83	-0.95
Canada	1990	-0.34	-0.55	-0.70	-0.62	-0.86	-1.14	-0.71	-0.90	-0.83	-0.95
New Zealand	1996	-0.34	-0.55	-0.70	-0.62	-0.86	-1.14	-0.71	-0.90	-0.83	-0.95
Belgium	1990	-0.34	-0.55	-0.70	-0.62	-0.86	-1.15	-0.71	-0.90	-0.83	-0.95
Norway	1993	-0.35	-0.55	-0.70	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.95
France	1999	-0.35	-0.55	-0.70	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.95
Belgium	1999	-0.35	-0.55	-0.70	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.95
Japan	1990	-0.35	-0.55	-0.70	-0.62	-0.87	-1.15	-0.71	-0.90	-0.83	-0.95
Netherlands	1999	-0.35	-0.55	-0.70	-0.62	-0.87	-1.16	-0.71	-0.90	-0.83	-0.96
Austria	1990	-0.35	-0.55	-0.70	-0.62	-0.87	-1.16	-0.71	-0.90	-0.83	-0.96
New Zealand	1993	-0.35	-0.55	-0.70	-0.62	-0.87	-1.16	-0.71	-0.90	-0.83	-0.96
Iceland	1990	-0.35	-0.55	-0.70	-0.62	-0.87	-1.16	-0.71	-0.90	-0.83	-0.96
United Kingdom	1990	-0.35	-0.55	-0.70	-0.62	-0.87	-1.16	-0.71	-0.90	-0.84	-0.96
Denmark	1990	-0.35	-0.56	-0.70	-0.62	-0.87	-1.17	-0.71	-0.91	-0.84	-0.96
Netherlands	1990	-0.35	-0.56	-0.70	-0.62	-0.87	-1.17	-0.71	-0.91	-0.84	-0.96
Luxembourg	1985	-0.36	-0.56	-0.70	-0.62	-0.87	-1.17	-0.71	-0.91	-0.84	-0.96
Spain	1996	-0.36	-0.56	-0.70	-0.62	-0.87	-1.17	-0.71	-0.91	-0.84	-0.96
Japan	1999	-0.36	-0.56	-0.70	-0.62	-0.87	-1.18	-0.71	-0.91	-0.84	-0.96
Israel	1996	-0.36	-0.56	-0.70	-0.62	-0.87	-1.18	-0.71	-0.91	-0.84	-0.96
Australia	1990	-0.36	-0.56	-0.70	-0.62	-0.87	-1.18	-0.71	-0.91	-0.84	-0.96
Sweden	1996	-0.36	-0.56	-0.70	-0.62	-0.87	-1.18	-0.71	-0.91	-0.84	-0.96
Sweden	1993	-0.36	-0.56	-0.70	-0.62	-0.87	-1.18	-0.71	-0.91	-0.84	-0.96
Spain	1999	-0.36	-0.56	-0.70	-0.62	-0.87	-1.18	-0.71	-0.91	-0.84	-0.97
Ireland	1999	-0.36	-0.56	-0.70	-0.62	-0.87	-1.18	-0.71	-0.91	-0.84	-0.97

Note: Countries were sorted by real income per capita.

Table 5.9. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	-0.36	-0.56	-0.70	-0.62	-0.87	-1.19	-0.71	-0.91	-0.84	-0.97
Sweden	1990	-0.36	-0.56	-0.70	-0.62	-0.87	-1.19	-0.71	-0.91	-0.84	-0.97
France	1985	-0.36	-0.56	-0.70	-0.62	-0.87	-1.19	-0.71	-0.91	-0.84	-0.97
Ireland	1996	-0.36	-0.56	-0.70	-0.62	-0.87	-1.19	-0.71	-0.91	-0.84	-0.97
Germany	1985	-0.36	-0.56	-0.70	-0.62	-0.87	-1.20	-0.71	-0.91	-0.84	-0.97
Sweden	1999	-0.36	-0.56	-0.70	-0.62	-0.87	-1.20	-0.71	-0.91	-0.84	-0.97
Finland	1996	-0.36	-0.56	-0.70	-0.62	-0.87	-1.20	-0.71	-0.91	-0.84	-0.97
Portugal	1996	-0.36	-0.56	-0.70	-0.62	-0.87	-1.20	-0.71	-0.91	-0.84	-0.97
Spain	1993	-0.36	-0.56	-0.70	-0.62	-0.87	-1.20	-0.71	-0.91	-0.84	-0.97
Greece	1999	-0.36	-0.56	-0.70	-0.62	-0.87	-1.20	-0.71	-0.91	-0.84	-0.97
Portugal	1999	-0.36	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.91	-0.84	-0.97
Portugal	1993	-0.37	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.91	-0.84	-0.97
Greece	1996	-0.37	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.91	-0.84	-0.97
Finland	1993	-0.37	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.91	-0.84	-0.97
Italy	1985	-0.37	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.91	-0.84	-0.97
Australia	1985	-0.37	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.91	-0.84	-0.97
Japan	1985	-0.37	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.92	-0.84	-0.98
Belgium	1985	-0.37	-0.56	-0.70	-0.62	-0.87	-1.21	-0.71	-0.92	-0.84	-0.98
New Zealand	1990	-0.37	-0.56	-0.70	-0.62	-0.87	-1.22	-0.71	-0.92	-0.84	-0.98
Greece	1993	-0.37	-0.56	-0.70	-0.62	-0.87	-1.22	-0.71	-0.92	-0.84	-0.98
Netherlands	1985	-0.37	-0.56	-0.70	-0.62	-0.88	-1.22	-0.71	-0.92	-0.84	-0.98
Finland	1990	-0.37	-0.56	-0.70	-0.62	-0.88	-1.23	-0.71	-0.92	-0.84	-0.98
Finland	1999	-0.37	-0.56	-0.70	-0.62	-0.88	-1.23	-0.71	-0.92	-0.84	-0.98
Ireland	1993	-0.37	-0.56	-0.70	-0.62	-0.88	-1.23	-0.71	-0.92	-0.84	-0.98
Denmark	1985	-0.37	-0.56	-0.70	-0.62	-0.88	-1.24	-0.72	-0.92	-0.84	-0.98

Note: Countries were sorted by real income per capita.

Table 5.9. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	-0.37	-0.56	-0.70	-0.62	-0.88	-1.24	-0.72	-0.92	-0.84	-0.98
United Kingdom	1985	-0.38	-0.56	-0.70	-0.62	-0.88	-1.25	-0.72	-0.92	-0.84	-0.99
Israel	1999	-0.38	-0.56	-0.70	-0.62	-0.88	-1.25	-0.72	-0.92	-0.84	-0.99
New Zealand	1985	-0.38	-0.56	-0.70	-0.62	-0.88	-1.26	-0.72	-0.93	-0.85	-0.99
Sweden	1985	-0.38	-0.56	-0.70	-0.62	-0.88	-1.27	-0.72	-0.93	-0.85	-0.99
Spain	1990	-0.38	-0.56	-0.70	-0.62	-0.88	-1.27	-0.72	-0.93	-0.85	-0.99
Norway	1985	-0.38	-0.56	-0.70	-0.62	-0.88	-1.27	-0.72	-0.93	-0.85	-0.99
Austria	1985	-0.38	-0.56	-0.70	-0.62	-0.88	-1.27	-0.72	-0.93	-0.85	-0.99
Slovenia	1996	-0.38	-0.57	-0.70	-0.62	-0.88	-1.28	-0.72	-0.93	-0.85	-1.00
Slovenia	1999	-0.38	-0.57	-0.70	-0.62	-0.88	-1.30	-0.72	-0.93	-0.85	-1.00
Czech Republic	1996	-0.39	-0.57	-0.70	-0.62	-0.89	-1.32	-0.72	-0.94	-0.85	-1.01
Finland	1985	-0.39	-0.57	-0.70	-0.62	-0.89	-1.32	-0.72	-0.94	-0.85	-1.01
Spain	1985	-0.39	-0.57	-0.70	-0.62	-0.89	-1.34	-0.72	-0.94	-0.85	-1.01
Korea	1999	-0.39	-0.57	-0.70	-0.62	-0.89	-1.34	-0.72	-0.94	-0.85	-1.01
Czech Republic	1999	-0.39	-0.57	-0.70	-0.62	-0.89	-1.35	-0.72	-0.94	-0.85	-1.02
Portugal	1990	-0.39	-0.57	-0.70	-0.62	-0.89	-1.37	-0.72	-0.94	-0.85	-1.02
Ireland	1990	-0.40	-0.57	-0.70	-0.62	-0.89	-1.42	-0.72	-0.95	-0.86	-1.03
Greece	1990	-0.40	-0.57	-0.70	-0.62	-0.89	-1.43	-0.72	-0.95	-0.86	-1.04
Hungary	1996	-0.40	-0.58	-0.70	-0.62	-0.90	-1.49	-0.72	-0.96	-0.86	-1.05
Mexico	1996	-0.40	-0.58	-0.70	-0.62	-0.90	-1.51	-0.72	-0.96	-0.86	-1.05
Estonia	1999	-0.40	-0.58	-0.70	-0.62	-0.90	-1.52	-0.72	-0.96	-0.86	-1.05
Hungary	1999	-0.40	-0.58	-0.70	-0.62	-0.90	-1.52	-0.72	-0.96	-0.86	-1.06
Greece	1985	-0.40	-0.58	-0.70	-0.62	-0.90	-1.53	-0.72	-0.97	-0.86	-1.06
Slovak Republic	1999	-0.40	-0.58	-0.70	-0.62	-0.90	-1.53	-0.72	-0.97	-0.86	-1.06
Slovak Republic	1996	-0.40	-0.58	-0.70	-0.62	-0.90	-1.60	-0.72	-0.97	-0.87	-1.07

Note: Countries were sorted by real income per capita.

Table 5.9. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	-0.41	-0.58	-0.70	-0.62	-0.91	-1.62	-0.72	-0.98	-0.87	-1.07
Mexico	1999	-0.41	-0.58	-0.70	-0.62	-0.91	-1.62	-0.72	-0.98	-0.87	-1.07
Poland	1999	-0.41	-0.58	-0.70	-0.62	-0.91	-1.64	-0.72	-0.98	-0.87	-1.08
Poland	1996	-0.41	-0.58	-0.70	-0.62	-0.91	-1.65	-0.72	-0.98	-0.87	-1.08
Ireland	1985	-0.41	-0.58	-0.70	-0.62	-0.91	-1.68	-0.72	-0.98	-0.87	-1.08
Bulgaria	1999	-0.41	-0.58	-0.70	-0.62	-0.91	-1.68	-0.72	-0.98	-0.87	-1.08
Russian Federation	1996	-0.41	-0.58	-0.70	-0.62	-0.91	-1.73	-0.72	-0.99	-0.87	-1.09
Croatia	1999	-0.41	-0.58	-0.70	-0.62	-0.91	-1.78	-0.72	-0.99	-0.87	-1.10
Portugal	1985	-0.41	-0.58	-0.70	-0.62	-0.91	-1.79	-0.72	-0.99	-0.87	-1.10
Latvia	1999	-0.41	-0.58	-0.70	-0.62	-0.92	-1.87	-0.73	-1.00	-0.87	-1.11
Turkey	1999	-0.41	-0.58	-0.70	-0.62	-0.92	-1.97	-0.73	-1.00	-0.88	-1.13
Macedonia	1999	-0.41	-0.59	-0.70	-0.62	-0.92	-2.00	-0.73	-1.01	-0.88	-1.13
Russian Federation	1999	-0.41	-0.59	-0.70	-0.62	-0.94	-3.01	-0.73	-1.04	-0.89	-1.20
Romania	1999	-0.41	-0.59	-0.70	-0.62	-0.94	-3.08	-0.73	-1.05	-0.89	-1.21
Ukraine	1999	-0.41	-0.59	-0.70	-0.62	-0.96	-7.55	-0.73	-1.08	-0.90	-1.29
Average		-0.35	-0.56	-0.70	-0.62	-0.87	-1.31	-0.71	-0.92	-0.84	-0.98

Note: Countries were sorted by real income per capita.

Table 5.10. Cournot own-price elasticities for 10 broad consumption group, pooled data

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1999	-0.26	-0.55	-0.76	-0.80	-0.93	-1.13	-0.87	-0.97	-0.92	-1.01
Luxembourg	1993	-0.27	-0.55	-0.76	-0.80	-0.93	-1.13	-0.87	-0.97	-0.92	-1.01
United States	1996	-0.27	-0.55	-0.76	-0.80	-0.93	-1.13	-0.87	-0.97	-0.92	-1.01
Luxembourg	1996	-0.27	-0.56	-0.76	-0.80	-0.93	-1.13	-0.87	-0.97	-0.92	-1.01
United States	1993	-0.29	-0.56	-0.76	-0.80	-0.93	-1.13	-0.87	-0.97	-0.92	-1.01
United States	1999	-0.29	-0.56	-0.76	-0.80	-0.93	-1.14	-0.87	-0.98	-0.92	-1.01
Switzerland	1993	-0.36	-0.57	-0.76	-0.80	-0.94	-1.17	-0.87	-0.98	-0.92	-1.03
United States	1990	-0.36	-0.57	-0.76	-0.80	-0.94	-1.17	-0.87	-0.98	-0.92	-1.03
Switzerland	1996	-0.37	-0.57	-0.76	-0.80	-0.94	-1.17	-0.87	-0.98	-0.92	-1.03
United States	1985	-0.37	-0.57	-0.76	-0.80	-0.94	-1.18	-0.87	-0.99	-0.92	-1.03
Japan	1996	-0.38	-0.58	-0.76	-0.80	-0.94	-1.18	-0.87	-0.99	-0.92	-1.03
Switzerland	1999	-0.38	-0.58	-0.76	-0.80	-0.94	-1.18	-0.87	-0.99	-0.92	-1.03
Belgium	1996	-0.39	-0.58	-0.76	-0.80	-0.94	-1.19	-0.87	-0.99	-0.92	-1.03
Belgium	1993	-0.39	-0.58	-0.76	-0.80	-0.94	-1.19	-0.87	-0.99	-0.93	-1.03
Japan	1993	-0.39	-0.58	-0.76	-0.80	-0.94	-1.19	-0.87	-0.99	-0.93	-1.03
Cyprus	1999	-0.39	-0.58	-0.76	-0.80	-0.94	-1.19	-0.87	-0.99	-0.93	-1.03
Luxembourg	1990	-0.39	-0.58	-0.76	-0.80	-0.94	-1.19	-0.87	-0.99	-0.93	-1.03
Germany	1996	-0.39	-0.58	-0.76	-0.80	-0.94	-1.19	-0.87	-0.99	-0.93	-1.03
Canada	1996	-0.40	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
Germany	1993	-0.40	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
Canada	1993	-0.40	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
Australia	1996	-0.40	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
France	1993	-0.40	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
Iceland	1996	-0.41	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
Switzerland	1990	-0.41	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04

Note: Countries were sorted by real income per capita.

Table 5.10. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Austria	1999	-0.41	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
Netherlands	1996	-0.41	-0.58	-0.76	-0.80	-0.94	-1.20	-0.87	-0.99	-0.93	-1.04
Italy	1993	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Netherlands	1993	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Austria	1993	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Iceland	1999	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Austria	1996	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Italy	1999	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Italy	1996	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Denmark	1996	-0.41	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
France	1996	-0.42	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Australia	1993	-0.42	-0.58	-0.76	-0.80	-0.94	-1.21	-0.87	-0.99	-0.93	-1.04
Italy	1990	-0.43	-0.59	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.93	-1.05
Iceland	1993	-0.43	-0.59	-0.76	-0.80	-0.95	-1.22	-0.87	-1.00	-0.93	-1.05
Germany	1990	-0.43	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
France	1990	-0.43	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Canada	1999	-0.43	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Canada	1985	-0.43	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
United Kingdom	1996	-0.43	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Denmark	1999	-0.44	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
United Kingdom	1993	-0.44	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Denmark	1993	-0.44	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Germany	1999	-0.44	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Australia	1999	-0.44	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Norway	1996	-0.44	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05

Note: Countries were sorted by real income per capita.

Table 5.10. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United Kingdom	1999	-0.44	-0.59	-0.76	-0.80	-0.95	-1.23	-0.87	-1.00	-0.93	-1.05
Norway	1999	-0.44	-0.59	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Canada	1990	-0.44	-0.59	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
New Zealand	1996	-0.44	-0.59	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Belgium	1990	-0.44	-0.59	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Norway	1993	-0.45	-0.59	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
France	1999	-0.45	-0.59	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Belgium	1999	-0.45	-0.59	-0.76	-0.80	-0.95	-1.24	-0.87	-1.00	-0.93	-1.05
Japan	1990	-0.45	-0.59	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.05
Netherlands	1999	-0.45	-0.59	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.05
Austria	1990	-0.45	-0.59	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
New Zealand	1993	-0.46	-0.59	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
Iceland	1990	-0.46	-0.59	-0.76	-0.80	-0.95	-1.25	-0.87	-1.00	-0.93	-1.06
United Kingdom	1990	-0.46	-0.59	-0.76	-0.80	-0.95	-1.26	-0.87	-1.00	-0.93	-1.06
Denmark	1990	-0.46	-0.59	-0.76	-0.80	-0.95	-1.26	-0.87	-1.00	-0.93	-1.06
Netherlands	1990	-0.46	-0.59	-0.76	-0.80	-0.95	-1.26	-0.87	-1.00	-0.93	-1.06
Luxembourg	1985	-0.46	-0.59	-0.76	-0.80	-0.95	-1.27	-0.87	-1.00	-0.93	-1.06
Spain	1996	-0.46	-0.59	-0.76	-0.80	-0.95	-1.27	-0.87	-1.00	-0.93	-1.06
Japan	1999	-0.47	-0.59	-0.76	-0.80	-0.95	-1.27	-0.87	-1.00	-0.93	-1.06
Israel	1996	-0.47	-0.60	-0.76	-0.80	-0.95	-1.27	-0.87	-1.00	-0.93	-1.06
Australia	1990	-0.47	-0.60	-0.76	-0.80	-0.95	-1.27	-0.87	-1.00	-0.93	-1.06
Sweden	1996	-0.47	-0.60	-0.76	-0.80	-0.95	-1.27	-0.87	-1.00	-0.93	-1.06
Sweden	1993	-0.47	-0.60	-0.76	-0.80	-0.95	-1.27	-0.87	-1.01	-0.93	-1.06
Spain	1999	-0.47	-0.60	-0.76	-0.80	-0.95	-1.27	-0.87	-1.01	-0.93	-1.06
Ireland	1999	-0.47	-0.60	-0.76	-0.80	-0.95	-1.27	-0.87	-1.01	-0.93	-1.06

Note: Countries were sorted by real income per capita.

Table 5.10. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
New Zealand	1999	-0.47	-0.60	-0.76	-0.80	-0.95	-1.28	-0.87	-1.01	-0.93	-1.06
Sweden	1990	-0.47	-0.60	-0.76	-0.80	-0.95	-1.28	-0.87	-1.01	-0.93	-1.06
France	1985	-0.48	-0.60	-0.76	-0.80	-0.95	-1.28	-0.87	-1.01	-0.93	-1.06
Ireland	1996	-0.48	-0.60	-0.76	-0.80	-0.95	-1.28	-0.87	-1.01	-0.93	-1.06
Germany	1985	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.06
Sweden	1999	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.07
Finland	1996	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.07
Portugal	1996	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.07
Spain	1993	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.07
Greece	1999	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.07
Portugal	1999	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.07
Portugal	1993	-0.48	-0.60	-0.76	-0.80	-0.95	-1.29	-0.87	-1.01	-0.93	-1.07
Greece	1996	-0.48	-0.60	-0.76	-0.80	-0.95	-1.30	-0.87	-1.01	-0.93	-1.07
Finland	1993	-0.48	-0.60	-0.76	-0.80	-0.95	-1.30	-0.87	-1.01	-0.93	-1.07
Italy	1985	-0.48	-0.60	-0.76	-0.80	-0.95	-1.30	-0.87	-1.01	-0.93	-1.07
Australia	1985	-0.48	-0.60	-0.76	-0.80	-0.95	-1.30	-0.87	-1.01	-0.93	-1.07
Japan	1985	-0.49	-0.60	-0.76	-0.80	-0.95	-1.30	-0.87	-1.01	-0.93	-1.07
Belgium	1985	-0.49	-0.60	-0.76	-0.80	-0.95	-1.30	-0.87	-1.01	-0.93	-1.07
New Zealand	1990	-0.49	-0.60	-0.76	-0.80	-0.95	-1.30	-0.87	-1.01	-0.93	-1.07
Greece	1993	-0.49	-0.60	-0.76	-0.80	-0.95	-1.31	-0.87	-1.01	-0.93	-1.07
Netherlands	1985	-0.49	-0.60	-0.76	-0.80	-0.95	-1.31	-0.87	-1.01	-0.93	-1.07
Finland	1990	-0.49	-0.60	-0.76	-0.80	-0.95	-1.31	-0.87	-1.01	-0.93	-1.07
Finland	1999	-0.49	-0.60	-0.76	-0.80	-0.95	-1.31	-0.87	-1.01	-0.93	-1.07
Ireland	1993	-0.49	-0.60	-0.76	-0.80	-0.95	-1.31	-0.87	-1.01	-0.93	-1.07
Denmark	1985	-0.50	-0.60	-0.76	-0.80	-0.96	-1.32	-0.87	-1.01	-0.94	-1.08

Note: Countries were sorted by real income per capita.

Table 5.10. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Norway	1990	-0.50	-0.60	-0.76	-0.80	-0.96	-1.33	-0.87	-1.01	-0.94	-1.08
United Kingdom	1985	-0.50	-0.60	-0.76	-0.80	-0.96	-1.33	-0.87	-1.02	-0.94	-1.08
Israel	1999	-0.51	-0.60	-0.76	-0.80	-0.96	-1.34	-0.87	-1.02	-0.94	-1.08
New Zealand	1985	-0.51	-0.61	-0.76	-0.80	-0.96	-1.35	-0.87	-1.02	-0.94	-1.08
Sweden	1985	-0.51	-0.61	-0.76	-0.80	-0.96	-1.35	-0.87	-1.02	-0.94	-1.08
Spain	1990	-0.51	-0.61	-0.76	-0.80	-0.96	-1.35	-0.87	-1.02	-0.94	-1.08
Norway	1985	-0.51	-0.61	-0.76	-0.80	-0.96	-1.35	-0.87	-1.02	-0.94	-1.08
Austria	1985	-0.51	-0.61	-0.76	-0.80	-0.96	-1.35	-0.87	-1.02	-0.94	-1.08
Slovenia	1996	-0.51	-0.61	-0.76	-0.80	-0.96	-1.36	-0.87	-1.02	-0.94	-1.09
Slovenia	1999	-0.52	-0.61	-0.76	-0.80	-0.96	-1.38	-0.87	-1.02	-0.94	-1.09
Czech Republic	1996	-0.53	-0.61	-0.76	-0.80	-0.96	-1.40	-0.87	-1.03	-0.94	-1.10
Finland	1985	-0.53	-0.61	-0.76	-0.80	-0.96	-1.40	-0.87	-1.03	-0.94	-1.10
Spain	1985	-0.53	-0.61	-0.76	-0.80	-0.96	-1.41	-0.87	-1.03	-0.94	-1.10
Korea	1999	-0.54	-0.61	-0.76	-0.80	-0.96	-1.42	-0.87	-1.03	-0.94	-1.10
Czech Republic	1999	-0.54	-0.61	-0.76	-0.80	-0.96	-1.43	-0.87	-1.03	-0.94	-1.10
Portugal	1990	-0.54	-0.62	-0.76	-0.80	-0.96	-1.45	-0.87	-1.03	-0.94	-1.11
Ireland	1990	-0.55	-0.62	-0.76	-0.80	-0.97	-1.49	-0.87	-1.04	-0.94	-1.12
Greece	1990	-0.56	-0.62	-0.76	-0.80	-0.97	-1.50	-0.87	-1.04	-0.94	-1.12
Hungary	1996	-0.57	-0.62	-0.76	-0.80	-0.97	-1.56	-0.87	-1.05	-0.95	-1.13
Mexico	1996	-0.57	-0.62	-0.76	-0.80	-0.97	-1.58	-0.87	-1.05	-0.95	-1.13
Estonia	1999	-0.57	-0.62	-0.76	-0.80	-0.97	-1.59	-0.87	-1.05	-0.95	-1.14
Hungary	1999	-0.57	-0.62	-0.76	-0.80	-0.97	-1.59	-0.87	-1.05	-0.95	-1.14
Greece	1985	-0.58	-0.62	-0.76	-0.80	-0.97	-1.60	-0.87	-1.05	-0.95	-1.14
Slovak Republic	1999	-0.58	-0.62	-0.76	-0.80	-0.97	-1.60	-0.87	-1.05	-0.95	-1.14
Slovak Republic	1996	-0.58	-0.63	-0.76	-0.80	-0.98	-1.67	-0.87	-1.06	-0.95	-1.15

Note: Countries were sorted by real income per capita.

Table 5.10. Continued

Country	Year	Food	Beverages and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Lithuania	1999	-0.59	-0.63	-0.76	-0.80	-0.98	-1.69	-0.87	-1.06	-0.95	-1.15
Mexico	1999	-0.59	-0.63	-0.76	-0.80	-0.98	-1.69	-0.87	-1.06	-0.95	-1.15
Poland	1999	-0.59	-0.63	-0.76	-0.80	-0.98	-1.70	-0.87	-1.06	-0.95	-1.15
Poland	1996	-0.59	-0.63	-0.76	-0.80	-0.98	-1.72	-0.87	-1.06	-0.95	-1.16
Ireland	1985	-0.59	-0.63	-0.76	-0.80	-0.98	-1.74	-0.87	-1.06	-0.95	-1.16
Bulgaria	1999	-0.59	-0.63	-0.76	-0.80	-0.98	-1.74	-0.87	-1.06	-0.95	-1.16
Russian Federation	1996	-0.60	-0.63	-0.76	-0.80	-0.98	-1.79	-0.87	-1.07	-0.95	-1.17
Croatia	1999	-0.60	-0.63	-0.76	-0.80	-0.98	-1.84	-0.87	-1.07	-0.95	-1.18
Portugal	1985	-0.60	-0.63	-0.76	-0.80	-0.98	-1.85	-0.87	-1.07	-0.95	-1.18
Latvia	1999	-0.61	-0.63	-0.76	-0.80	-0.99	-1.93	-0.87	-1.08	-0.96	-1.19
Turkey	1999	-0.62	-0.64	-0.76	-0.80	-0.99	-2.03	-0.87	-1.08	-0.96	-1.20
Macedonia	1999	-0.62	-0.64	-0.76	-0.80	-0.99	-2.06	-0.87	-1.08	-0.96	-1.20
Russian Federation	1999	-0.64	-0.65	-0.76	-0.80	-1.00	-3.06	-0.87	-1.12	-0.97	-1.27
Romania	1999	-0.65	-0.65	-0.76	-0.80	-1.00	-3.12	-0.87	-1.12	-0.97	-1.27
Ukraine	1999	-0.67	-0.65	-0.76	-0.80	-1.02	-7.59	-0.87	-1.15	-0.98	-1.35
Average		-0.47	-0.60	-0.76	-0.80	-0.95	-1.40	-0.87	-1.01	-0.93	-1.07

Note: Countries were sorted by real income per capita.

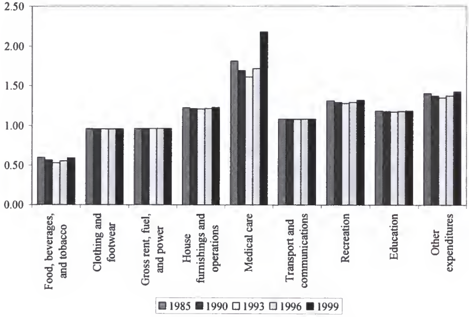

Figure 5.1. Average income elasticities of the demand for nine broad consumption groups when data are pooled

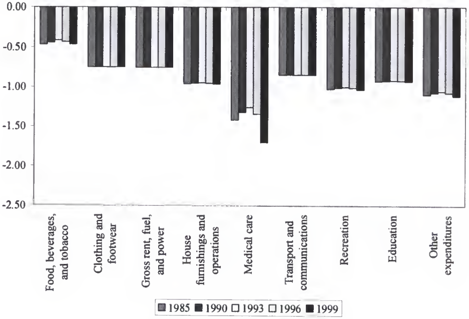

Figure 5.2. Average Frisch own-price elasticities of the demand for nine broad consumption groups when data are pooled

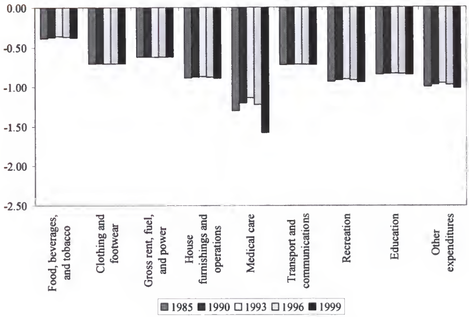

Figure 5.3. Average Slutsky own-price elasticities of the demand for nine broad consumption groups when data are pooled

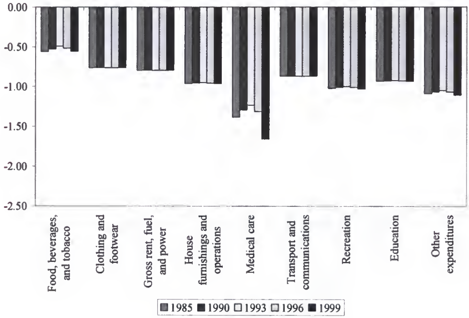

Figure 5.4. Average Cournot own-price elasticities of the demand for broad consumption groups when data are pooled

CHAPTER 6
ANALYSIS OF INDIVIDUAL YEAR: THE FOOD SUBGROUPS

The second stage of the two-stage budgeting process is the allocation of the group expenditures to the commodities within each group. In our study, after consumers allocate their total expenditures to nine broad consumption groups, they further allocate their expenditures on the food, beverages, and tobacco category among its eight subcategories. This chapter covers the empirical results and estimation method of the allocation within the food group using the Florida Slutsky model.

Allocation to Food Subgroups

The allocation to subgroups is the second stage of the budgeting process. Conditional on group expenditures, consumers allocate their group expenditures among commodities within the groups. The second stage is similar to the first stage except the process moves farther down the branch within the utility tree. The utility maximization process is based on group expenditures and relative prices within the group, not on total expenditures and relative prices of the group. As such, the income and price sensitivities obtained in this stage are conditional values.

The second stage of the budgeting process in our study is the allocation of food expenditure among eight food commodities as follows:

- Cereals and bread
- Meat and fish
- Fats and oil
- Fruit and vegetables
- Other foods
- Beverages and tobacco
- Food consumed away from home

Unlike the allocation to the broad groups, the calculated income elasticity in the second stage of the budgeting process measures percentage change in quantity demanded for a percentage change in the food (group) expenditure. This is simply the income elasticity being conditional on a given food expenditure. Likewise, the conditional own-price elasticity measures percentage change in quantity demanded for a percentage change in its own price, given the food expenditure. Because weak separability is assumed in the allocation of food expenditure to food subgroups, the Florida Slutsky model is more appropriate for the analysis. Unlike with the Florida PI model, individual goods within the group can be inferior under the Florida Slutsky model.

Conditional Florida Slutsky Model

We can rewrite the demand equation under the Florida PI model as

$$W_g d(\log Q_g) = \Theta_g d(\log Q) + \phi\Theta_g d\left[\log\left(\frac{P_g^*}{P^*}\right)\right], \tag{6.1}$$

where W_g , Θ_g, and ϕ are the group budget share, the group marginal share, and the income flexibility, respectively. Specifically, the group budget share and the group marginal share are defined as

$$W_g = \sum_{i \in S_g} w_i \text{ , and} \tag{6.2}$$

$$\Theta_g = \sum_{i \in S_g} \theta_i \text{ ,} \tag{6.3}$$

where w_i and θ_i are the budget share and marginal share of good i within group S_g, respectively. The terms $d(\log Q)$ and $d(\log P^*)$ are defined earlier in Equations 3.36 and 3.39, respectively. The term $d(\log Q_g)$ is the group Divisia volume index and the term $d(\log P_g^*)$ is the group Frisch price index. The group Divisia volume index and the group Frisch price index can be expressed as

$$d(\log Q_g) = \sum_{i \in S_g} \frac{w_i}{W_g} d(\log q_i), \text{ and} \tag{6.4}$$

$$d(\log P_g^*) = \sum_{i \in S_g} \frac{\theta_i}{\Theta_g} d(\log p_i), \tag{6.5}$$

where w_i and θ_i are the budget share and marginal share of good i within group S_g, respectively, q_i is the quantity demanded for good i, and p_i is the price of good i. Dividing Equation 6.1 by W_g gives

$$d(\log Q_g) = \frac{\Theta_g}{W_g} d(\log Q) + \phi \frac{\Theta_g}{W_g} d\left[\log\left(\frac{P_g^*}{P^*}\right)\right]. \tag{6.6}$$

In the case of the Florida Slutsky model (from Equation 3.41), the demand equation can be rewritten in its conditional form as

$$w_i^* d(\log q_i) = \theta_i^* d(\log Q_g) + \sum_{j=1}^{n} \pi_{ij}^* d(\log p_j), \tag{6.7}$$

where w_i^* and θ_i^* are the conditional budget share and the conditional marginal share of good i, respectively, given group expenditure. In other words, $w_i^* = w_i / W_g$ and $\theta_i^* = \theta_i / \Theta_g$. The term π_{ij}^* is the conditional Slutsky price parameter. By using Equation 6.7, the Florida Slutsky model can be rewritten in terms of a conditional demand system for item $i = 1,\ldots, n$ within group S_g as

$$\begin{aligned} w_{ic}^* = {} & \alpha_i + \beta_i q_{gc} + (\alpha_i + \beta_i q_{gc})\left[\log\left(\frac{p_{ic}}{\overline{p}_i}\right) - \sum_{j=1}^{n} (\alpha_j + \beta_j q_{gc}) \log\left(\frac{p_{jc}}{\overline{p}_j}\right)\right] \\ & + \sum_{j=1}^{n} \pi_{ij}^* \log\left(\frac{p_{jc}}{\overline{p}_j}\right) + \varepsilon_{ic}, \end{aligned} \tag{6.8}$$

where $w_{ic}^{*} = w_{ic} / W_{gc}$ or the conditional budget share of good $i \in S_g$ in country *c*, given group expenditure (w_{ic} is the unconditional budget share of good $i \in S_g$ in country *c* and W_{gc} is the group budget share in country *c*); $q_{gc} = \log Q_{gc}$ or the natural logarithm of total group expenditure of country *c*; and π_{ij}^{*} is the conditional Slutsky price parameter for $i, j \in S_g$.

Maximum Likelihood Estimates for Food Subgroups

In this chapter, the Florida Slutsky model is fitted to each round of the OECD data for the eight disaggregated food, beverages, and tobacco categories. Table 6.1 reports parameter estimates of the food subgroups and their respective asymptotic standard errors for the years 1985, 1990, 1993, 1996, and 1999. Because our income elasticities are evaluated at the geometric mean prices, the sign of the β coefficient indicates whether a particular food item is conditionally income elastic or inelastic. A negative β coefficient indicates that a particular food item is conditionally income inelastic, while a positive β coefficient indicates that a particular food item is conditionally income elastic. Our results suggest that the cereals and bread and the fats and oil subgroups are conditionally income inelastic food items in every round. The β coefficients of demand for cereals and bread are statistically significant at the 5% level in every round except 1990. The values range from -0.100 in 1985 to -0.039 in 1990, -0.078 in 1993, -0.069 in 1996, and -0.045 in 1999. Similarly, β coefficients of the demand for fats and oil are statistically significant at the 5% level in every round except 1993. The values range from -0.051 in 1985 to -0.037 in 1990, -0.008 in 1993, -0.013 in 1996, and -0.014 in 1999.

Food consumed away from home is a conditionally income elastic food item in every round except 1993. The β coefficient of demand for food away from home ranges from 0.333 in 1985 to 0.320 in 1990, 0.167 (not statistically significant at the 5% level) in 1993, 0.235 in 1996, and 0.161 in 1999. The meat and fish subgroup is conditionally income inelastic in almost every round. Although meat and fish subgroup is conditionally income elastic in 1993, its β coefficient is not statistically significant at the 5% level. The β coefficients of demand for meat and fish range from -0.138 in 1985 to -0.160 in 1990, 0.007 in 1993, -0.055 in 1996, and -0.061 in 1999. Dairy is conditionally income elastic in 1985, with the β coefficient equaling 0.016 (not statistically significant at the 5% level), but are conditionally income inelastic in 1990, 1993, 1996, and 1999. The β coefficients of demand for dairy are not statistically significant at the 5% level in 1990 and 1993 but are statistically significant at the 5% level in 1996 and 1999. The β coefficients of demand for dairy equal -0.015 in 1990, -0.002 in 1993, -0.049 in 1996, and -0.042 in 1999.

The fruit and vegetables subgroup is conditionally income inelastic in 1985, 1996, and 1999 but is conditionally income elastic in 1990 and 1993. The β coefficients of demand for fruit and vegetables range from -0.025 in 1985 to 0.018 in 1990, 0.036 in 1993, -0.025 in 1996, and -0.066 (statistically significant at the 5% level) in 1999. The demand for the other foods subgroup is conditionally income inelastic, except in 1990. The β coefficients of demand for other foods are statistically significant at the 5% level in 1993 and 1996. The values of the β coefficients of demand for other foods range from -0.003 in 1985 to 0.008 in 1990, -0.075 in 1993, -0.045 in 1996, and -0.023 in 1999. Finally, demand for beverages and tobacco is conditionally income inelastic between

1985 and 1993 but is conditionally income elastic in 1996 and 1999. The β coefficients of demand for beverages and tobacco range from -0.033 in 1985 to -0.095 in 1990, -0.047 in 1993, 0.020 in 1996, and 0.090 (statistically significant at the 5% level) in 1999.

The diagonal of the Slutsky coefficients of demand for all food items are also with the correct signs, except for cereals and bread in 1985 and fats and oil in 1999. The Slutsky coefficients of demand for cereals and bread are statistically significant at the 5% level in 1990 and 1999, with values varying from 0.009 in 1985 to -0.099 in 1990, -0.051 in 1993, -0.024 in 1996, in -0.087 for 1999. The Slutsky coefficients of demand for meat and fish, dairy, fruit and vegetables, and other foods are statistically significant at the 5% level in every round. The Slutsky coefficients of demand for meat and fish ranges from -0.160 in 1985 to -0.183 in 1990, -0.134 in 1993, -0.125 in 1996, and -0.122 in 1999. The Slutsky coefficients of demand for dairy range from -0.091 in 1985 to -0.105 in 1990, -0.151 in 1993, -0.081 in 1996, and -0.118 in 1999. In case of the demand for fruit and vegetables, the Slutsky coefficients range from -0.216 in 1985 to -0.161 in 1990, -0.125 in 1993, -0.137 in 1996, and -0.091 in 1999. Similarly, the Slutsky coefficients of demand for other foods range from -0.28 in 1985 to -0.127 in 1990, -0.117 in 1993, -0.078 in 1996, and -0.083 in 1999.

Fats and oil subgroup has Slutsky coefficients ranging from -0.008 in 1985 to -0.009 in 1990, -0.012 in 1993, -0.014 in 1996, and 0.005 in 1999. The Slutsky coefficients of demand for fats and oil are statistically significant at the 5% level in 1990, 1993, and 1996. In addition, the Slutsky coefficients of demand for beverages and tobacco range from -0.031 in 1985 to -0.112 (statistically significant at the 5% level) in 1990, -0.080 in 1993, -0.119 (statistically significant at the 5% level) in 1996, -0.002 in

1999. Finally, the Slutsky coefficients of demand for food away from home are statistically significant at the 5% level for all years. The Slutsky coefficients of demand for food away from home range from -0.245 in 1985 to -0.391 in 1990, -0.341 in 1993, -0.200 in 1996, and -0.145 in 1999. These parameter estimates will be used to obtain income and own-price elasticities (Appendix C).

Maximum Likelihood Procedure for the Florida Slutsky Model

For estimation purposes, it is necessary to eliminate one equation from the demand systems. Because the choice of the omitted equation does not have an impact on the end result (Barten, 1969), we disregard the *n*th equation from the estimation. The conditional Florida Slutsky model for item $i = 1,\ldots, n\text{-}1$ within group S_g as

$$w_{ic}^{*} = \alpha_i + \beta_i q_{gc} + (\alpha_i + \beta_i q_{gc})\left[x_{ic} - \sum_{j=1}^{n-1}(\alpha_j + \beta_j q_{gc})x_{jc}\right] + \sum_{j=1}^{n-1}\pi_{ij}^{*}x_{jc} + \varepsilon_{ic}\,, \quad (6.9)$$

where $w_{ic}^{*} = w_{ic}/W_{gc}$ or the conditional budget share of good $i \in S_g$ in country *c*, given group expenditure (w_{ic} is the unconditional budget share of good $i \in S_g$ in country *c* and W_{gc} is the group budget share in country *c*); $q_{gc} = \log Q_{gc}$ or the natural logarithm of total group expenditure of country *c*; π_{ij}^{*} is the conditional Slutsky price parameter; and $x_{ic} = \log(p_{ic}/\overline{p}_i) - \log(p_{nc}/\overline{p}_n)$ for $i, j \in S_g$.

As a result, in matrix notation, the Florida Slutsky model for $i = 1,\ldots, n\text{-}1$ takes the form

$$w_c^{*} = f_c^{*}(\theta) + \varepsilon_c\,, \quad (6.10)$$

where θ is the parameter vector which consists of n-1 elements of subvector α, n-1 elements of subvector β, and subvector π^{*}. Note that subvector π^{*} has been transformed from a $(n-1)\times(n-1)$ matrix. The terms w_c^* and ε_c are column vectors of n-1 elements. It is noted that $f_c^*(\theta)$ is defined as

$$f_c^*(\theta)=\alpha+q_{gc}\beta+X_c(\alpha+q_{gc}\beta)-(\alpha+q_{gc}\beta)x_c^T(\alpha+q_{gc}\beta)+X_d\pi^*, \qquad (6.11)$$

where X_c is the diagonal matrix of order n-1 with x_{ic} as the ith diagonal element and x_c is the column vector (x_c^T is its transpose) with x_{ic} as its ith element ($i \in S_g$ and $i = 1,\ldots, n$-1). The term X_d is constructed to ensure the imposition of the symmetry restriction on the conditional Slutsky price matrix (π^*).

For $c = 1,\ldots, N$ and $\varepsilon_c \sim N(0, \Sigma)$, the log-likelihood function is defined as

$$L=\text{constant}+\frac{1}{2}N\log\left|\Sigma^{-1}\right|-\frac{1}{2}\sum_{c=1}^{N}[w_c^*-f_c^*(\theta)]^T\Sigma^{-1}[w_c^*-f_c^*(\theta)], \qquad (6.12)$$

where N is the number of countries. The unknown parameters are θ and Σ. In this case, it is useful to transform the log-likelihood function to the concentrated log-likelihood function. The concentrated log-likelihood function can be derived by calculating the first-order derivatives of the log-likelihood function with respect to Σ, given θ, and setting the equation to zero. Let $R(\theta)$ be the solution for Σ as a function of θ, thus

$$R(\theta)=\frac{1}{N}\sum_{c=1}^{N}[w_c^*-f_c^*(\theta)][w_c^*-f_c^*(\theta)]^T. \qquad (6.13)$$

Substituting $R(\theta)$ for Σ in the log-likelihood function gives the concentrated log-likelihood function, which is

$$L^*=\text{constant}+\frac{1}{2}N\log\left|R(\theta)^{-1}\right|. \qquad (6.14)$$

The first-order derivatives of L^* with respect to θ is

$$\frac{dL^*}{d\theta} = \sum_{c=1}^{N} \left[\frac{df_c^*(\theta)}{d\theta^T} \right]^T R(\theta)^{-1} [w_c^* - f_c^*(\theta)], \tag{6.15}$$

where $df_c^*(\theta) / d\theta^T$ consists of three submatrices:

$$\frac{df_c^*(\theta)}{d\alpha^T} = A, \tag{6.16}$$

$$\frac{df_c^*(\theta)}{d\beta^T} = q_c A, \text{ and} \tag{6.17}$$

$$\frac{df_c^*(\theta)}{d\pi^*} = X_d, \tag{6.18}$$

where $A = X_c - (\alpha + q_{gc}\beta)x_c^T + [1 - (\alpha + q_{gc}\beta)^T x_c] I_{n-1}$ and $I_{n\text{-}1}$ is the identity matrix of order n-1.

The Hessian matrix or the second-order derivatives of L^* with respect to θ is

$$\frac{d^2 L^*}{d\theta d\theta^T} = K(\theta) + J(\theta), \text{ where} \tag{6.19}$$

$$K(\theta) = -\sum_{c=1}^{N} \left[\frac{df_c^*(\theta)}{d\theta^T} \right]^T R(\theta)^{-1} \left[\frac{df_c^*(\theta)}{d\theta^T} \right], \text{ and} \tag{6.20}$$

$J(\theta)$ is a matrix that is linear in $w_c^* - f_c^*(\theta)$ for $c = 1,\ldots, N$. The asymptotic covariance matrix of the maximum likelihood estimator of θ is equal to minus the inverse of the expectation of the second derivatives of L^* with respect to θ. Because $J(\theta)$ has zero expectation and $K(\theta)$ is nonrandom, the asymptotic covariance matrix of the maximum likelihood estimator of θ is $-K(\theta)^{-1}$. The maximum likelihood estimates $\hat{\theta}$ can be obtained by using the method of scoring. The asymptotic standard errors are the square root of the diagonal elements of the asymptotic covariance matrix (Theil et al., 1989).

Table 6.1. Parameter estimates for food subgroups between 1985 and 1999

Parameters/Food subgroups	1985		1990		1993		1996		1999	
Beta (β)										
Cereals and bread	-0.100*	(0.017)	-0.039	(0.045)	-0.078*	(0.026)	-0.069*	(0.015)	-0.045*	(0.013)
Meat and fish	-0.138*	(0.040)	-0.160*	(0.040)	0.007	(0.041)	-0.055*	(0.017)	-0.061*	(0.025)
Dairy	0.016	(0.021)	-0.015	(0.035)	-0.002	(0.021)	-0.049*	(0.011)	-0.042*	(0.011)
Fats and oil	-0.051*	(0.011)	-0.037*	(0.010)	-0.008	(0.006)	-0.013*	(0.004)	-0.014*	(0.005)
Fruit and vegetables	-0.025	(0.020)	0.018	(0.042)	0.036	(0.034)	-0.025	(0.014)	-0.066*	(0.011)
Other foods	-0.003	(0.027)	0.008	(0.036)	-0.075*	(0.030)	-0.045*	(0.014)	-0.023	(0.012)
Beverages and tobacco	-0.033	(0.061)	-0.095	(0.083)	-0.047	(0.068)	0.020	(0.032)	0.090*	(0.022)
Food away from home	0.333*	(0.083)	0.320*	(0.094)	0.167	(0.098)	0.235*	(0.043)	0.161*	(0.035)
Alpha (α)										
Cereals and bread	0.047*	(0.007)	0.074*	(0.013)	0.071*	(0.007)	0.064*	(0.007)	0.081*	(0.007)
Meat and fish	0.149*	(0.016)	0.148*	(0.012)	0.181*	(0.011)	0.148*	(0.009)	0.142*	(0.016)
Dairy	0.089*	(0.008)	0.084*	(0.010)	0.081*	(0.005)	0.063*	(0.005)	0.063*	(0.007)
Fats and oil	0.011*	(0.005)	0.012*	(0.003)	0.017*	(0.001)	0.016*	(0.002)	0.016*	(0.004)
Fruit and vegetables	0.101*	(0.008)	0.112*	(0.012)	0.114*	(0.009)	0.099*	(0.007)	0.076*	(0.006)
Other foods	0.085*	(0.011)	0.088*	(0.010)	0.063*	(0.008)	0.068*	(0.008)	0.081*	(0.008)
Beverages and tobacco	0.171*	(0.026)	0.156*	(0.025)	0.181*	(0.020)	0.211*	(0.017)	0.257*	(0.014)
Food away from home	0.347*	(0.034)	0.326*	(0.028)	0.292*	(0.028)	0.333*	(0.022)	0.284*	(0.020)
Diagonal of π_{ij}										
Cereals and bread	0.009	(0.028)	-0.099*	(0.051)	-0.051	(0.028)	-0.024	(0.024)	-0.087*	(0.019)
Meat and fish	-0.160*	(0.061)	-0.083*	(0.029)	-0.134*	(0.039)	-0.125*	(0.026)	-0.122*	(0.058)
Dairy	-0.091*	(0.022)	-0.105*	(0.021)	-0.151*	(0.021)	-0.081*	(0.021)	-0.118*	(0.019)
Fats and oil	-0.008	(0.013)	-0.009*	(0.005)	-0.012*	(0.005)	-0.014*	(0.005)	0.005	(0.010)
Fruit and vegetables	-0.216*	(0.031)	-0.161*	(0.039)	-0.125*	(0.033)	-0.137*	(0.024)	-0.091*	(0.024)
Other foods	-0.280*	(0.036)	-0.127*	(0.024)	-0.117*	(0.028)	-0.078*	(0.026)	-0.083*	(0.024)
Beverages and tobacco	-0.031	(0.047)	-0.112*	(0.054)	-0.080	(0.048)	-0.119*	(0.042)	-0.002	(0.039)
Food away from home	-0.245*	(0.101)	-0.391*	(0.076)	-0.341*	(0.080)	-0.200*	(0.051)	-0.145*	(0.064)

Note: Asymptotic standard errors of the associated parameters are shown in parentheses and * denotes statistically significant at the 5% level.

CHAPTER 7
ANALYSIS OF POOLED DATA: THE FOOD SUBGROUPS

This chapter provides a discussion of the estimation method and discusses the empirical results for food subgroups obtained from pooling the cross-country and time-series data. Results include parameter estimates and their corresponding demand elasticities.

AR(1) Corrected Maximum Likelihood Estimation Procedure

In contrast to Chapter 5, the conditional functional form of the Florida Slutsky model is applied to the allocation of total food expenditure among food subgroups instead of the functional form of the Florida PI model (Equation 5.1). The general form of the Florida Slutsky model at time *t* (for good $i = 1, \ldots, n-1$ and $i \in S_g$) can be written as

$$w_{ct}^{*} = f_{ct}^{*}(\theta) + \varepsilon_{ct}\text{, and} \tag{7.1}$$

$$\varepsilon_{ct} = \tau\varepsilon_{c,t-1} + \nu_{ct}, \tag{7.2}$$

where subscript *t* indicates different reference years or phases (i.e., $t = 1, 2, 3, 4$, or 5 for reference years 1985, 1990, 1993, 1996, or 1999, respectively); w_{ct}^{*} is the conditional budget share of country *c* at time *t*, given food expenditure; $f_{ct}^{*}(\theta)$ is a conditional functional form of the Florida Slutsky model at time *t* (Equation 6.11); θ is the parameter vector that consists of n-1 elements of subvector α, n-1 elements of subvector β and subvector π^{*} or the conditional Slutsky price parameter; ε_{ct} is the disturbance term of country *c* at time *t*; ν_{ct} is independent, identically distributed $N(0, \Sigma_{\nu})$; and $-1 < \tau < 1$.

Given the relationships in Equations 7.1 and 7.2, we form the covariance matrix of ε_c when country c participates in h phases (Ω_h), where h equals 1, 2, 4, or 5. Recall that after excluding outlying observations, 11 countries are participating in one phase. Eight countries are participating in two phases. Two countries are participating in four phases. Twenty-one countries are participating in five phases and no country participates in three phases.

Let Ω_h be the covariance matrix of ε_c when country c participates in h phases, where h equals 1, 2, 4, or 5. Given the relationship in Equation 7.2, the form of Ω_h depends on the value of h or the number of phases in which countries participate. This can be defined as

$$\Omega_1 = \Sigma, \tag{7.3}$$

$$\Omega_2 = \begin{bmatrix} \Sigma & \tau\Sigma \\ \tau\Sigma & \Sigma \end{bmatrix}, \tag{7.4}$$

$$\Omega_4 = \begin{bmatrix} \Sigma & \tau\Sigma & \tau^2\Sigma & \tau^3\Sigma \\ \tau\Sigma & \Sigma & \tau\Sigma & \tau^2\Sigma \\ \tau^2\Sigma & \tau\Sigma & \Sigma & \tau\Sigma \\ \tau^3\Sigma & \tau^2\Sigma & \tau\Sigma & \Sigma \end{bmatrix}, \text{ and} \tag{7.5}$$

$$\Omega_5 = \begin{bmatrix} \Sigma & \tau\Sigma & \tau^2\Sigma & \tau^3\Sigma & \tau^4\Sigma \\ \tau\Sigma & \Sigma & \tau\Sigma & \tau^2\Sigma & \tau^3\Sigma \\ \tau^2\Sigma & \tau\Sigma & \Sigma & \tau\Sigma & \tau^2\Sigma \\ \tau^3\Sigma & \tau^2\Sigma & \tau\Sigma & \Sigma & \tau\Sigma \\ \tau^4\Sigma & \tau^3\Sigma & \tau^2\Sigma & \tau\Sigma & \Sigma \end{bmatrix}. \tag{7.6}$$

The term Ω_h is used to formulate the AR(1) corrected concentrated log-likelihood function. With an additional parameter τ, the AR(1) corrected concentrated log-likelihood function is defined as

$$L^{*} = \text{constant} + \frac{1}{2}(n-1)N\log(1-\tau^{2}) + \frac{1}{2}N^{*}\log\left|R(\theta,\tau)^{-1}\right|, \tag{7.7}$$

where θ is a vector of α, β, and π^{*}, respectively; $N = N_1 + N_2 + N_3 + N_4 + N_5$; $N^{*} = N_1 + 2N_2 + 3N_3 + 4N_4 + 5N_5$; and

$$\begin{aligned} R(\theta,\tau) &= \left(\frac{1}{N^{*}}\right)\left[(1-\tau^{2})\sum_{c=1}^{42}\varepsilon_{c1}\varepsilon_{c1}^{T} + \sum_{c=12}^{42}(\varepsilon_{c2}-\tau\varepsilon_{c1})(\varepsilon_{c2}-\tau\varepsilon_{c1})^{T}\right] \\ &+ \left(\frac{1}{N^{*}}\right)\left[\sum_{c=20}^{42}(\varepsilon_{c3}-\tau\varepsilon_{c2})(\varepsilon_{c3}-\tau\varepsilon_{c2})^{T} + \sum_{c=20}^{42}(\varepsilon_{c4}-\tau\varepsilon_{c3})(\varepsilon_{c4}-\tau\varepsilon_{c3})^{T}\right] \\ &+ \left(\frac{1}{N^{*}}\right)\left[\sum_{c=22}^{42}(\varepsilon_{c5}-\tau\varepsilon_{c4})(\varepsilon_{c5}-\tau\varepsilon_{c4})^{T}\right]. \end{aligned} \tag{7.8}$$

Defining $df_{ct}^{*}(\theta)/d\theta^{T}$ as the first-order derivative of the functional form of the conditional Florida Slutsky model at time t with respect to parameter θ (θ is a vector of α, β, and π^{*}). The term $df_{ct}^{*}(\theta)/d\theta^{T}$ consists of three submatrices:

$$\frac{df_{ct}^{*}(\theta)}{d\alpha^{T}} = A, \tag{7.9}$$

$$\frac{df_{ct}^{*}(\theta)}{d\beta^{T}} = q_{c}A, \text{ and} \tag{7.10}$$

$$\frac{df_{ct}^{*}(\theta)}{d\pi^{*}} = X_{d}, \tag{7.11}$$

where $A = X_{c} - (\alpha + q_{gc}\beta)x_{c}^{T} + [1-(\alpha + q_{gc}\beta)^{T}x_{c}]I_{n-1}$ and I_{n-1} is the identity matrix of order n-1. The first-order derivatives of the concentrated likelihood function with respect to θ and τ are as follows:

$$\begin{aligned} \frac{dL^{*}}{d\theta} &= (1-\tau^{2})\sum_{c=1}^{42}\left[\frac{df_{c1}^{*}(\theta)}{d\theta^{T}}\right]R(\theta,\tau)^{-1}\varepsilon_{c1} \\ &+ \sum_{c=12}^{42}\left[\frac{df_{c2}^{*}(\theta)}{d\theta^{T}} - \tau\frac{df_{c1}^{*}(\theta)}{d\theta^{T}}\right]R(\theta,\tau)^{-1}(\varepsilon_{c2}-\tau\varepsilon_{c1}) \end{aligned}$$

$$+\sum_{c=20}^{42}\left[\frac{df_{c3}^{*}(\theta)}{d\theta^{T}}-\tau\frac{df_{c2}^{*}(\theta)}{d\theta^{T}}\right]R(\theta,\tau)^{-1}(\varepsilon_{c3}-\tau\varepsilon_{c2})$$

$$+\sum_{c=20}^{42}\left[\frac{df_{c4}^{*}(\theta)}{d\theta^{T}}-\tau\frac{df_{c3}^{*}(\theta)}{d\theta^{T}}\right]R(\theta,\tau)^{-1}(\varepsilon_{c4}-\tau\varepsilon_{c3})$$

$$+\sum_{c=22}^{42}\left[\frac{df_{c5}^{*}(\theta)}{d\theta^{T}}-\tau\frac{df_{c4}^{*}(\theta)}{d\theta^{T}}\right]R(\theta,\tau)^{-1}(\varepsilon_{c5}-\tau\varepsilon_{c4})\,, \tag{7.12}$$

$$\frac{dL^{*}}{d\tau}=\frac{-(n-1)N\tau}{1-\tau^{2}}+\tau\sum_{c=1}^{42}\varepsilon_{c1}^{T}R(\theta,\tau)^{-1}\varepsilon_{c1}+\sum_{c=12}^{42}\varepsilon_{c1}^{T}R(\theta,\tau)^{-1}(\varepsilon_{c2}-\tau\varepsilon_{c1})$$

$$+\sum_{c=20}^{42}\varepsilon_{c2}^{T}R(\theta,\tau)^{-1}(\varepsilon_{c3}-\tau\varepsilon_{c2})+\sum_{c=20}^{42}\varepsilon_{c3}^{T}R(\theta,\tau)^{-1}(\varepsilon_{c4}-\tau\varepsilon_{c3})$$

$$+\sum_{c=22}^{42}\varepsilon_{c4}^{T}R(\theta,\tau)^{-1}(\varepsilon_{c5}-\tau\varepsilon_{c4})\,. \tag{7.13}$$

Define H as the Hessian of the concentrated log-likelihood function with respect to θ and τ. Therefore, the matrix of the second-order derivative or the Hessian of the concentrated log-likelihood function with respect to θ and τ takes the form

$$H=\begin{bmatrix}\dfrac{d^{2}L^{*}}{d\theta d\theta^{T}} & \dfrac{d^{2}L^{*}}{d\theta d\tau}\\ \dfrac{d^{2}L^{*}}{d\theta d\tau} & \dfrac{d^{2}L^{*}}{d\tau^{2}}\end{bmatrix}. \tag{7.14}$$

The estimated asymptotic covariance matrix of the maximum likelihood estimators ($\hat{\theta}$ and $\hat{\tau}$) can be derived by taking the negative value of the inverse of the expectation of the Hessian matrix. That is, the estimated asymptotic covariance matrix of the maximum likelihood estimators is

$$-[E(H)]^{-1}=-\begin{bmatrix}E\left(\dfrac{d^{2}L^{*}}{d\theta d\theta^{T}}\right) & E\left(\dfrac{d^{2}L^{*}}{d\theta d\tau}\right)\\ E\left(\dfrac{d^{2}L^{*}}{d\theta d\tau}\right) & E\left(\dfrac{d^{2}L^{*}}{d\tau^{2}}\right)\end{bmatrix}^{-1}. \tag{7.15}$$

Recall that the error terms have zero expectation; therefore the expectation of the second-order derivatives of the concentrated log-likelihood function with respect to θ and τ or $E\left(d^2L^*/d\theta d\tau\right)$ equals zero. As such, the estimated asymptotic covariance matrix of the maximum likelihood estimators can be simplified as

$$-[E(H)]^{-1}=-\begin{bmatrix} E\left(\dfrac{d^2L^*}{d\theta d\theta^T}\right) & 0 \\ 0 & E\left(\dfrac{d^2L^*}{d\tau^2}\right)\end{bmatrix}^{-1}, \tag{7.16}$$

where

$$\begin{aligned} E\left(\frac{d^2L^*}{d\theta d\theta^T}\right) &= -(1-\tau^2)\sum_{c=1}^{42}\left[\frac{df^*_{c1}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df^*_{c1}(\theta)}{d\theta^T}\right] \\ &-\sum_{c=12}^{42}\left[\frac{df^*_{c2}(\theta)}{d\theta^T}-\tau\frac{df^*_{c1}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df^*_{c2}(\theta)}{d\theta^T}-\tau\frac{df^*_{c1}(\theta)}{d\theta^T}\right] \\ &-\sum_{c=20}^{42}\left[\frac{df^*_{c3}(\theta)}{d\theta^T}-\tau\frac{df^*_{c2}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df^*_{c3}(\theta)}{d\theta^T}-\tau\frac{df^*_{c2}(\theta)}{d\theta^T}\right] \\ &-\sum_{c=20}^{42}\left[\frac{df^*_{c4}(\theta)}{d\theta^T}-\tau\frac{df^*_{c3}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df^*_{c4}(\theta)}{d\theta^T}-\tau\frac{df^*_{c3}(\theta)}{d\theta^T}\right] \\ &-\sum_{c=22}^{42}\left[\frac{df^*_{c5}(\theta)}{d\theta^T}-\tau\frac{df^*_{c4}(\theta)}{d\theta^T}\right]R(\theta,\tau)^{-1}\left[\frac{df^*_{c5}(\theta)}{d\theta^T}-\tau\frac{df^*_{c4}(\theta)}{d\theta^T}\right],\text{ and} \end{aligned} \tag{7.17}$$

$$E\left(\frac{d^2L^*}{d\tau^2}\right)=-\left(\frac{(n-1)N(1+\tau^2)}{(1-\tau^2)^2}\right). \tag{7.18}$$

The asymptotic standard errors of the maximum likelihood estimators are simply the square root of the diagonal elements of Equation 7.16. Finally, the first- and second-order derivatives of the concentrated log-likelihood function are used as part of an updating process in the method of scoring to estimate the unknown parameters.

AR(1) Corrected Maximum Likelihood Estimates for Food Subgroups

Table 7.1 illustrates the pooled estimates for eight food subgroups. According to the United States Department of Labor, recall that the ratios of the 1985, 1990, 1993, 1996, and 1999 consumer price index for all urban consumers and the 1999 consumer price index for all urban consumers are 0.65, 0.78, 0.87, 0.94, and 1.00, respectively. Real food expenditures per capita of the pooled data are converted to 1999 dollars by dividing real income per capita by the ratio of the consumer price index for all urban consumers from each individual year and the 1999 consumer price index for all urban consumers. We normalize such that the real income per capita of the United States in 1999 equals one. As mentioned earlier, the sign of the β coefficient indicates whether a particular food item is conditionally income elastic or inelastic. A negative β coefficient indicates that a particular food item is conditionally income inelastic, while a positive β coefficient indicates that a particular food item is conditionally income elastic. Our pooled estimates show that two of the food subgroups (i.e., beverages and tobacco and food away from home) are conditionally income elastic. The β coefficient for beverages and tobacco equals 0.005 and is not statistically significant at the 5% level. However, the β coefficient for food away from home equals 0.135 and is statistically significant at the 5% level.

The rest of the food subgroups (i.e., cereals and bread, meat and fish, dairy, fats and oil, fruit and vegetables, and other foods) have negative β coefficients, indicating that they are conditionally income inelastic. The β coefficients for cereals and bread, meat and fish, fats and oil, and fruit and vegetables are statistically significant at the 5% level, while the β coefficients for dairy and other foods are not statistically significant at the 5%

level. Specifically, the β coefficient for cereals and bread equals -0.046. The β coefficient for meat and fish equals -0.033. The β coefficient for dairy equals -0.008. The β coefficient for fats and oil equals -0.021. The β coefficient for fruit and vegetables equals -0.022. The β coefficient for other foods equals -0.011.

The diagonal of the Slutsky coefficients of demand for all food items also have the correct signs. The Slutsky coefficients are all statistically significant at the 5% level, except for cereals and bread. The Slutsky coefficients of demands for cereals and bread, meat and fish, dairy, fats and oil, fruit and vegetables, other foods, beverages and tobacco, and food away from home are -0.012, -0.168, -0.125, -0.043, -0.104, -0.145, -0.061, and -0.174, respectively.

In most cases, pooled estimates for eight food subgroups fall within the values of the estimates obtained from the individual phases (see Chapter 6). For instance, the β coefficient of demand for cereals and bread (obtained by fitting the Florida Slutsky model to each round of data individually) ranges between -0.100 (statistically significant at the 5% level) in 1985 and -0.039 (not statistically significant at the 5% level) in 1990, while the β coefficient of the demand for cereals and bread (obtained by fitting the Florida Slutsky model to the pooled data) equals -0.046 and is statistically significant at the 5% level. The β coefficient of demand for fats and oil (obtained by fitting the Florida Slutsky model to each round of data individually) ranges between -0.051 (statistically significant at the 5% level) in 1985 and -0.008 (not statistically significant at the 5% level) in 1993, while the β coefficient of the demand for fats and oil (obtained by fitting the Florida Slutsky model to the pooled data) equals -0.021 and is statistically significant at the 5% level. The diagonal of the Slutsky coefficients of demand for all food items are also statistically significant at the 5% level in most cases. The autoregressive parameter equals 0.842 and is statistically significant at the 5% level.

Pooling the data increases the accuracy of the estimated parameters compared to parameters obtained by fitting the Florida Slutsky model to each round of data individually. This is because of the additional information gained from consumers across the OECD region over time. Increasing sample size by pooling the data is useful, especially for the Florida Slutsky model (due to the increasing number of parameters to be estimated). In addition, most of the estimated parameters appear to be statistically significant at the 5% level and the asymptotic standard errors are considerably smaller when data are pooled. These pooled estimates are used in the following subsections to obtain demand elasticities for the pooled data.

Income and Price Sensitivity

Conditional on total food expenditure, consumers allocate their food expenditure among eight food subgroups. The utility maximization process will be based on total food expenditures and relative prices within the food group, not on total expenditures and relative prices of the food group. As such, the income and price sensitivities obtained from the Florida Slutsky model are conditional values. Income and own-price elasticity measures of the Florida Slutsky model are also defined at the observed per capita food expenditure of country c (Q_{gc}) and at the geometric mean prices ($\bar{p}_i$ for $i = 1, \ldots, n$, $i \in S_g$). To calculate the unconditional elasticity, the conditional elasticity needs to be adjusted such that the final values are based on the total expenditure instead of group expenditure. Unlike with the Florida PI model, individual goods within the group can be inferior under the Florida Slutsky model. Mathematical expressions and the empirical results for both the income elasticity of demand and the own-price elasticity obtained from the Florida Slutsky model are discussed as follows.

Income Elasticity of Demand

For the Florida Slutsky model, income elasticity of demand for good *i* indicates the percentage change in quantity demanded for good *i* when total food expenditure changes by 1%. This is simply income elasticity conditional on a given food expenditure. It is possible to convert these conditional elasticities to unconditional values so that the final results will be based on changes in total expenditure. In order to calculate the unconditional elasticities, some modifications are necessary. Recall Equation 6.7, we can derive the conditional demand elasticities of the disaggregated goods by differentiating $d(\log q_i)$ in Equation 6.7 by $d(\log Q_g)$. This gives the expression of the conditional income elasticity of the disaggregated goods as θ_i^* / w_i^*, where w_i^* and θ_i^* are the conditional budget share and the conditional marginal share of good *i*, respectively, given group expenditure. Recall from Chapter 6, by substituting Equation 6.6 into Equation 6.7 gives the unconditional form of the demand equation for the Florida Slutsky model,

$$w_i^* d(\log q_i) = \theta_i^* \left[\frac{\Theta_g}{W_g} d(\log Q) + \phi \frac{\Theta_g}{W_g} d\left[\log\left(\frac{P_g^*}{P^*} \right) \right] \right] + \sum_{j=1}^{n} \pi_{ij}^* d(\log p_j). \qquad (7.19)$$

Dividing Equation 7.19 by w_i^* gives

$$d(\log q_i) = \frac{\theta_i^*}{w_i^*} \left[\frac{\Theta_g}{W_g} d(\log Q) + \phi \frac{\Theta_g}{W_g} d\left[\log\left(\frac{P_g^*}{P^*} \right) \right] \right] + \sum_{j=1}^{n} \frac{\pi_{ij}^*}{w_i^*} d(\log p_j). \qquad (7.20)$$

Factoring in the term θ_i^* / w_i^* gives

$$d(\log q_i) = \frac{\theta_i^*}{w_i^*} \frac{\Theta_g}{W_g} d(\log Q) + \phi \frac{\theta_i^*}{w_i^*} \frac{\Theta_g}{W_g} d\left[\log\left(\frac{P_g^*}{P^*} \right) \right] + \sum_{j=1}^{n} \frac{\pi_{ij}^*}{w_i^*} d(\log p_j). \qquad (7.21)$$

Using Equation 7.21, we can derive the unconditional demand elasticities of the disaggregated goods. The unconditional income elasticity can be obtained by differentiating $d(\log q_i)$ in Equation 7.21 by $d(\log Q)$. Therefore, the unconditional income elasticity of the disaggregated good *i* (for $i \in S_g$) is

$$\eta_i^U = \frac{\theta_i^*}{w_i^*}\frac{\Theta_g}{W_g}. \tag{7.22}$$

This is simply the product of the conditional income elasticity (θ_i^* / w_i^*) and the group income elasticity (Θ_g / W_g). That is, the unconditional income elasticity of good *i* (for $i \in S_g$) in country *c* is

$$\eta_{ic}^U = \eta_{ic}^C \eta_i^G , \tag{7.23}$$

where η_{ic}^C is the conditional income elasticity of good *i* in country *c* (obtained from the second stage of the two-stage budgeting process), and η_i^G is the group income elasticity of good *i* (obtained from the first stage of the two-stage budgeting process).

Given total food expenditure, Tables 7.2 and 7.3 report the conditional and unconditional income elasticities of demand for food subgroups at the geometric mean prices for the pooled data, respectively. The estimated conditional income elasticities show a percentage change of demand for a particular food subgroup, given a one percentage change of total food expenditure, whereas the estimated unconditional income elasticities measure percentage change of demand, given a one percentage change of total income. The conditional income elasticities are converted to the unconditional income elasticities using income elasticities of the food, beverages, and tobacco category, which were estimated by fitting the Florida PI model to the pooled data (Table 5.2). Countries are sorted by descending order of percentage shares of their total real income per capita with respect to that of the United States in 1999. Our findings show that, given total food expenditure, beverages and tobacco and food away from home are conditionally income elastic food subgroups with conditional income elasticities greater than one. Food away from home is the most conditionally income elastic, with conditional income elasticities varying greatly from 1.45 for Luxembourg to 6.03 for Ukraine in 1999. Unlike food away from home, conditional income elasticities of demand for beverages and tobacco are approximately 1.03 for all countries in all years.

Conditional income elasticities of demand for the rest of the food subgroups are smaller than one, suggesting that they are conditionally income inelastic. On average, the fats and oil subgroup has the smallest conditional income elasticities. Conditional income elasticities of demand for fats and oil are negative for some higher income countries (e.g., Luxembourg in 1993, 1996, and 1999; the United States in 1996; Switzerland in 1999; and Cyprus in 1999). Negative conditional income elasticities indicate that a one percentage increase in food expenditure will decrease demand for fats and oil. For the rest of the sample, conditional income elasticities of demand for fats and oil range from 0.01 for Switzerland in 1996 to 0.63 for Ukraine in 1999. Cereals and bread is the next most conditionally income inelastic food subgroup, with conditional income elasticities ranging from 0.19 for Luxembourg to 0.69 for Ukraine in 1999. Conditional income elasticities for the rest of the food subgroups do not vary greatly across countries and time. For instance, conditional income elasticities of demand for meat and fish range from 0.79 for Luxembourg to 0.85 for Ukraine in 1999. Fruit and vegetables subgroup has conditional income elasticities ranging from 0.77 for

Luxembourg to 0.84 for Ukraine in 1999. Similarly, conditional income elasticities for other foods range from 0.87 for Luxembourg to 0.90 for Ukraine in 1999. Dairy is the least conditionally income inelastic food subgroup, with conditional income elasticities varying slightly from 0.91 for Luxembourg to 0.93 for Ukraine in 1999.

In the case of the unconditional income elasticities, the results show that most of the unconditional income elasticities are less than one (except for the demand for food away from home for some lower income countries). This confirms that the food group is a necessity in general. On average, the fats and oil subgroup has the smallest unconditional income elasticities, while food away from home has the largest unconditional income elasticities. Negative unconditional income elasticities of demand for fats and oil indicate that fats and oil is considered an inferior good for some higher income countries (e.g., Luxembourg in 1993, 1996, and 1999; the United States in 1996; Switzerland in 1999; and Cyprus in 1999) but is a necessity for all other countries in the pooled sample. On average, the fats and oil subgroup has the smallest unconditional income elasticities. Overall, the unconditional income elasticities of the demand for fats and oil range from -0.17 for Luxembourg to 0.46 for Ukraine in 1999. Cereals and bread subgroup is the next most necessary food item, with average unconditional income elasticity equaling 0.27. Unconditional income elasticities of demand for cereals and bread range from 0.07 for Luxembourg to 0.50 for Ukraine in 1999.

Unconditional income elasticities of demand for fruit and vegetables range from 0.31 for Luxembourg to 0.61 for Ukraine in 1999. In addition, the unconditional income elasticities of demand for meat and fish vary from 0.32 for Luxembourg to 0.62 for Ukraine in 1999. Dairy has unconditional income elasticities ranging between 0.37 for

Luxembourg and 0.68 for Ukraine in 1999. Finally, unconditional income elasticities for other foods and beverages and tobacco range from 0.35 and 0.41 for Luxembourg to 0.66 and 0.75 for Ukraine in 1999. Food away from home becomes a luxury food item as we move from higher income to lower income countries. Unconditional income elasticities of demand for food away from home range between 0.59 for Luxembourg and 4.40 for Ukraine in 1999.

Own-Price Elasticity of Demand

Own-price elasticities obtained from the Florida Slutsky model are conditional own-price elasticities, measuring percentage change in quantity demanded from a one percentage change in its own price, given the food expenditure. Three types of own-price elasticities of demand are discussed as follows. For simplicity, we ignore the country subscript *c*.

Frisch own-price elasticity

Given food expenditure, the Frisch own-price elasticity is defined as the own-price elasticity when there is an income compensation that keeps the marginal utility of income constant. This is simply elasticity with respect to the Frisch-deflated price of good *i*. The conditional Frisch own-price elasticity for the Florida Slutsky model can be expressed as

$$F^{C}_{Slutsky} = \frac{\phi\theta^{*}_{ii}}{w^{*}_{i}}, \tag{7.24}$$

where ϕ is the income flexibility obtained from the parameter estimation in the first stage; $\theta^{*}_{ii} = \theta_{ii}/\Theta_g$ (Θ_g is the group marginal share); and w^{*}_{i} is the conditional budget share of good *i* (for $i \in S_g$), given group expenditure. Unlike the unconditional income elasticity, formulations for the unconditional own-price elasticity are cumbersome.

Recall Equation 7.19, the unconditional Frisch own-price elasticity of the *i*th good is the elasticity with respect to the Frisch-deflated price of that good. Therefore, the unconditional Frisch own-price elasticity of the disaggregated good *i* (for $i \in S_g$) is

$$F^U_{Slutsky} = \phi \frac{\theta^*_i}{w^*_i} \frac{\Theta_g}{W_g} = \phi \eta^U_i , \tag{7.25}$$

where ϕ is the income flexibility (obtained from the parameter estimation in the first stage) and η^U_i is the unconditional income elasticity of disaggregated good *i* (for $i \in S_g$).

Slutsky own-price elasticity

Given food expenditure, the Slutsky own-price elasticity measures the change in demand of good *i* when its price changes while real income remains unchanged. It can be derived by differentiating $d(\log q_i)$ in Equation 6.7 by $d(\log p_i)$ and holding $d(\log Q_g)$ constant. The conditional Slutsky own-price elasticity for the Florida Slutsky model is

$$S^C_{Slutsky} = \frac{\pi^*_{ii}}{w^*_i} , \tag{7.26}$$

where π^*_{ii} is the conditional Slutsky price parameter and w^*_i is the conditional budget share of good *i* (for $i \in S_g$), given group expenditure. The unconditional Slutsky own-price elasticity is derived by differentiating $d(\log q_i)$ in Equation 7.19 by $d(\log p_i)$ and holding $d(\log Q)$ constant. The unconditional Slutsky own-price elasticity of the disaggregated good *i* is

$$S^U_{Slutsky} = \phi \frac{\theta^*_i}{w^*_i} \frac{\Theta_g}{W_g} \frac{\theta^*_i}{\Theta_g} (1 - \Theta_g) + \frac{\pi^*_{ii}}{w^*_i} . \tag{7.27}$$

Rearranging the first term of Equation 7.27 gives

$$S^{U}_{Slutsky} = \phi \frac{\theta_i^*}{w_i^*} \frac{\Theta_g}{W_g} \frac{\theta_i^*}{w_i^*} \frac{w_i^*}{\Theta_g} \left(1 - \Theta_g\right) + \frac{\pi_{ii}^*}{w_i^*}. \tag{7.28}$$

Using $\eta_i^G = \Theta_g / W_g$ and $\eta_i^C = \theta_i^* / w_i^*$, we can rewrite Equation 7.28 as

$$S^{U}_{Slutsky} = \phi \eta_i^C \eta_i^C \frac{w_i^*}{W_g} \left(1 - \eta_i^G W_g\right) + \frac{\pi_{ii}^*}{w_i^*}, \tag{7.29}$$

where ϕ is the income flexibility (obtained from the parameter estimation in the first stage); η_i^C is the conditional income elasticity of the disaggregated good *i* (for $i \in S_g$); w_i^* is the conditional budget share of good *i*, given group expenditure; η_i^G is the group income elasticity of good *i* (obtained from the first stage); W_g is the group budget share; and π_{ii}^* is the conditional Slutsky price parameter (obtained from the second stage).

Cournot own-price elasticity

Given food expenditure, the Cournot own-price elasticity measures the change in demand of good *i* when its price changes while nominal income remains unchanged but real income changes. It can be derived by differentiating $d(\log q_i)$ in Equation 6.7 by $d(\log p_i)$ and holding $d(\log E)$ constant, giving the expression for the conditional Cournot own-price elasticity as

$$C^{C}_{Slutsky} = \frac{\pi_{ii}^*}{w_i^*} - \theta_i^*, \tag{7.30}$$

where π_{ii}^* is the conditional Slutsky price parameter, w_i^* and θ_i^* are the conditional budget share and the conditional marginal share of good *i* (for $i \in S_g$), respectively, given group expenditure. Note that the conditional Cournot own-price elasticity of the Florida

Slutsky model is simply the difference between its conditional Slutsky own-price elasticity and the conditional marginal share of good *i*.

The unconditional Cournot own-price elasticity is derived by differentiating $d(\log q_i)$ in Equation 7.19 by $d(\log p_i)$ and holding $d(\log E)$ constant. The unconditional Cournot own-price elasticity of the disaggregated good *i* (for $i \in S_g$) is

$$C^U_{Slutsky} = \phi \frac{\theta_i^*}{w_i^*} \frac{\Theta_g}{W_g} \frac{\theta_i^*}{\Theta_g}\left(1 - \Theta_g\right) + \frac{\pi_{ii}^*}{w_i^*} - \frac{\theta_i^* \Theta_g}{W_g}. \tag{7.31}$$

Knowing that the sum of the first two terms of Equation 7.31 is the unconditional Slutsky own-price elasticity of disaggregated good *i* (see Equation 7.28), the unconditional Cournot own-price elasticity of disaggregated good *i* (for $i \in S_g$) can be written as

$$C^U_{Slutsky} = S^U_{Slutsky} - \frac{\theta_i^* \Theta_g}{W_g} = S^U_{Slutsky} - \eta_i^U w_i^*, \tag{7.32}$$

where $S^U_{Slutsky}$ is the unconditional Slutsky own-price elasticity of the disaggregated good; η_i^U is the unconditional income elasticity of the disaggregated good *i*; and w_i^* is the conditional budget share of good *i* (for $i \in S_g$), given the group expenditure.

In the analysis of the demand for food subgroups, conditional price elasticities measure percentage changes of demand for a particular food item for a one percentage change in food price, given total food expenditure. On the other hand, unconditional price elasticities measure percentage changes in demand for a particular food item for a one percentage change in food price, given total income. Only Frisch own-price elasticities are reported because of the presence of the term π_{ij}^* (for $i = j$) in the Slutsky and Cournot own-price elasticities. The fact that π_{ij}^* is constant across countries causes countries with smaller food expenditure shares (i.e., countries with higher level of affluence) to have larger absolute values of own-price elasticities. This is in contrast to the theory that the absolute values of own-price elasticities increase with decreasing income level.

Table 7.4 reports the unconditional Frisch own-price elasticities of demand for food subgroups for the pooled data. In the analysis of demand for food subgroups, unconditional price elasticities measure percentage changes in demand for a particular food item for a one percentage change in food price, given total income. Countries are sorted by descending order of percentage shares of their real income per capita with respect to that of the United States in 1999. Unconditional Frisch own-price elasticities are obtained using the unconditional income elasticities of demand for food subgroups obtained from the previous section and income flexibility (ϕ) estimated by fitting the Florida PI model to the pooled data in the first stage of the allocation process (Table 5.2).

In most cases, the unconditional Frisch own-price elasticities are negative (except for the fats and oil subgroup for some higher income countries such as Luxembourg in 1993, 1996, and 1999; the United States in 1996; Switzerland in 1999; and Cyprus in 1999). Because the fats and oil subgroup is an inferior good for those higher income countries, a one percentage increase in its price will increase their demand. The absolute values of the unconditional Frisch own-price elasticities of demand for seven food subgroups (cereals and bread, meat and fish, dairy, fats and oil, fruit and vegetables, other foods, and beverages and tobacco) are less than one (own-price inelastic) for all countries in all years. This indicates that a percentage increase in the price of these seven food subgroups will decrease its own demand by less than 1%. Specifically, the unconditional

Frisch own-price elasticities of demand for cereals and bread range from -0.06 for Luxembourg to -0.40 for Ukraine in 1999. Meat and fish subgroup has unconditional Frisch own-price elasticities ranging from -0.25 for Luxembourg to -0.49 for Ukraine in 1999. Dairy has unconditional Frisch own-price elasticities ranging from -0.29 for Luxembourg to -0.53 for Ukraine in 1999. Unconditional Frisch own-price elasticities of demand for fruit and vegetables range from -0.24 for Luxembourg to -0.48 for Ukraine in 1999. Similarly, the unconditional Frisch own-price elasticities of demand for other foods range from -0.28 for Luxembourg to -0.51 for Ukraine in 1999. Finally, the unconditional Frisch own-price elasticities of demand for beverages and tobacco range from -0.32 for Luxembourg to -0.59 for Ukraine in 1999.

In contrast, demand for food away from home has changed from an own-price inelastic food item to an own-price elastic food item as we move to countries with lower income levels. The unconditional Frisch own-price elasticities of demand for food away from home are between -0.46 for Luxembourg and -3.45 for Ukraine in 1999. On average, consumers are least responsive to the price change of demand for fats and oil, followed by cereals and bread, and fruit and vegetables. On the other hand, consumers are more responsive to the price change of demand for food away from home.

Figures 7.1 and 7.2 illustrate comparisons of average unconditional income and unconditional Frisch own-price elasticities of demand for food subgroups obtained from pooled estimates over time. Overall, comparisons of the average unconditional income elasticities show that average unconditional income elasticities of all food subgroups decrease between 1985 and 1993 but increase between 1993 and 1999. This suggests that demand for all food subgroups becomes less responsive to income changes between 1985 and 1993 but becomes more responsive to income changes between 1993 and 1999, especially for food away from home. On average, food away from home is a luxury in 1985 and 1999 but is a necessity between 1990 and 1996. In the case of unconditional Frisch own-price elasticities, demand for food items is less responsive to own-price changes between 1985 and 1993 but is more responsive to own-price changes between 1993 and 1999, especially for food away from home. However, on average, none of the food subgroups is own-price elastic.

Our findings are also comparable to other studies. For instance, Reimer and Hertel (2003) estimated a global demand system by fitting the AIDADS model to the 1996 ICP data. They reported income elasticity of the demand for 10 consumption categories (i.e., grains and other crops; meat, dairy, and fish; processed food, beverages, and tobacco; apparel and footwear; rent and house utilities; home furnishings and appliances; medical products and services; transport and communications; recreation and education; and other goods and services). In their study, grains and other crops is comparable to the cereals and bread and the fruits and vegetable subgroups in our study, while processed food is comparable to the fats and oil and the other foods subgroups in our study. In addition, in our study, food includes both food consumed at home and food consumed away from home.

Our pooled estimates show that the average unconditional income elasticity of demand for cereals and bread equals 0.27, while the average unconditional income elasticity of demand for fruit and vegetables equals 0.46. Reimer and Hertel (2003) suggested that income elasticity of demand for grains and other crops equals 0.286. Similarly, the average unconditional income elasticities of demands for meat and fish, and dairy equal 0.47 and 0.52, respectively, while income elasticity of demand for the meat, dairy, fish group from Reimer and Hertel (2003) equals 0.415. Recall that the fats and oil and the other foods subgroups are comparable to processed food in Reimer and Hertel (2003). In our study, the average unconditional income elasticities of demand for fats and oil, other foods, and beverages and tobacco equal 0.16, 0.50, and 0.59, respectively. Their study suggests that the income elasticity of demand for the processed food, beverages, and tobacco group equals 0.557. Overall, their results show that income elasticities of food items (such as grains and other crops; meat, dairy, and fish; and processed food, beverages, and tobacco) and apparel and footwear are significantly smaller than one, indicating that they are necessities.

Additionally, their results suggested that the rest of the consumption categories, except for apparel and footwear, are luxuries. Specifically, their findings show that income elasticities of demands for rent and housing utilities, home furnishings and appliances, medical products and services, transport and communication, and other goods and services equal 1.200, 1.044, 1.322, 1.155, and 1.336, respectively. Our pooled results (obtained from the Florida PI model) indicate that average income elasticities of demands for gross rent, fuel, and power; house furnishings and operations; medical care; transport and communications; and other expenditures equal 0.96, 1.22, 1.85, 1.08, and 1.39, respectively. In addition, our pooled results (obtained from the Florida PI model) indicate that recreation and education are luxuries, with average income elasticities equaling 1.30 and 1.18, respectively. In their study, the recreation and education group has income elasticity equaling 1.239.

Seale et al. (2003) fitted the Florida PI and the Florida Slutsky models to 114 developed and developing countries of the 1996 ICP data. They formed a two-stage budgeting process for nine broad consumption groups (food, beverages, and tobacco; clothing and footwear; gross rent, fuel, and power, house operations; medical care; education; transport; recreation; and others) and for eight food subgroups (beverages and tobacco, bread and cereals, meat, fish, dairy, fats and oil, fruit and vegetables, other foods). The difference is the food, beverages, and tobacco category in our study includes food consumed at home, food consumed away from home, and beverages and tobacco, while the food, beverages, and tobacco category in their study includes only food consumed at home and beverages and tobacco. Three heteroskedastic parameters were introduced for three groups of countries. The first group consisted of countries included in the first three phases (Phases I, II, and III) of the ICP. The second group consisted of countries added into Phase IV of the ICP, while the third group consisted of countries first appearing in the 1996 ICP data. They normalized such that the heteroskedastic parameter for the first group equals one.

Their estimates suggest that cereals and bread, fats and oil, fruit and vegetables are conditionally income inelastic food items. Seale et al. (2003) reported β coefficients of demand for cereals and bread, fats and oil, and fruit and vegetables to be -0.068 (with an asymptotic standard error of 0.008), -0.014 (with an asymptotic standard error of 0.003), and -0.025 (with an asymptotic standard error of 0.008). In our pooled results (Table 7.1), the β coefficients of demand for cereals and bread, fats and oil, and fruit and vegetables are -0.046, -0.021, and -0.022, respectively, and are statistically significant at the 5% level. In addition, their study showed that the rest of the food subgroups are conditionally income elastic, with positive β coefficient. However, the β coefficients of demand for meat and other foods are not statistically significant at the 5% level. The β coefficient of demand for meat equals 0.011 (not statistically significant at the 5% level) and the β coefficient of demand for fish equals 0.010 in their study, while the β coefficient in our study shows that meat and fish are conditionally income inelastic, with the β coefficient equaling -0.033 (statistically significant at the 5% level). Dairy is also conditionally income elastic in their study, with the β coefficient equaling 0.015. On the other hand, our study shows that dairy is conditionally income inelastic (but not statistically significant), with the β coefficient equaling -0.008. Beverages and tobacco are conditionally income elastic in both studies. In their study, the β coefficient of demand for beverages and tobacco equals 0.065 and is statistically significant at the 5% level, while the β coefficient of demand for beverages and tobacco in our study equals 0.005 (not statistically significant at the 5% level). Our study also shows that food away from home is the most conditionally income elastic food item. The β coefficient of demand for food away from home is statistically significant at the 5% level and equals 0.135.

In the cases of allocation of total income among broad consumption groups, Seale et al. (2003) reported only two categories (food, beverages, and tobacco, and clothing and footwear) to be necessities. Our pooled results (Table 5.1) report food, beverages, and tobacco; clothing and footwear; and gross rent, fuel, and power to be necessities. However, our β coefficients of demand for the clothing and footwear and the gross rent, fuel, and power categories are not statistically significant. In our study, the β coefficient of demand for food, beverages, and tobacco equals -0.115 (compared to -0.135 obtained by Seale et al., 2003). In addition, the β coefficients of demand for clothing and footwear and gross rent, fuel, and power in our study equal -0.003 and -0.007, respectively (compared to -0.006 and 0.027 obtained by Seale et al., 2003). The rest of the consumption categories are luxuries with positive β coefficients. The β coefficients of demand for house furnishings and operation, medical care, transport and communications, recreation, education, and other expenditures in our study equal 0.014, 0.037, 0.012, 0.022, 0.014, and 0.026 (compared to 0.012, 0.024, 0.021, 0.020, 0.005, and 0.032 obtained by Seale et al., 2003).

Table 7.1. Pooled estimates for food subgroups

Parameters	Food subgroups		
Beta (β)	Cereals and bread	-0.046*	(0.010)
	Meat and fish	-0.033*	(0.013)
	Dairy	-0.008	(0.007)
	Fats and oil	-0.021*	(0.004)
	Fruit and vegetables	-0.022*	(0.009)
	Other foods	-0.011	(0.008)
	Beverages and tobacco	0.005	(0.020)
	Food away from home	0.135*	(0.028)
Alpha (α)	Cereals and bread	0.071*	(0.006)
	Meat and fish	0.171*	(0.009)
	Dairy	0.090*	(0.005)
	Fats and oil	0.022*	(0.003)
	Fruit and vegetables	0.101*	(0.006)
	Other foods	0.095*	(0.006)
	Beverages and tobacco	0.196*	(0.014)
	Food away from home	0.253*	(0.018)
Diagonal of π_{ij}	Cereals and bread	-0.012	(0.008)
	Meat and fish	-0.168*	(0.008)
	Dairy	-0.125*	(0.009)
	Fats and oil	-0.043*	(0.004)
	Fruit and vegetables	-0.104*	(0.008)
	Other foods	-0.145*	(0.009)
	Beverages and tobacco	-0.061*	(0.005)
	Food away from home	-0.174*	(0.006)
Autoregressive (τ)		0.842*	(0.013)

Note: Asymptotic standard errors of the associated parameters are shown in parentheses and * are statistically significant at the 5% level.

Table 7.2. Conditional income elasticities for food subgroups, pooled data

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	1999	0.19	0.79	0.91	-0.41	0.77	0.87	1.03	1.45
Luxembourg	1993	0.30	0.80	0.91	-0.10	0.78	0.88	1.03	1.50
United States	1996	0.32	0.80	0.91	-0.05	0.78	0.88	1.03	1.51
Luxembourg	1996	0.26	0.80	0.91	-0.20	0.78	0.88	1.03	1.48
United States	1993	0.35	0.81	0.91	0.02	0.78	0.88	1.03	1.53
United States	1999	0.36	0.81	0.91	0.04	0.79	0.88	1.03	1.53
Switzerland	1993	0.38	0.81	0.92	0.07	0.79	0.88	1.03	1.55
United States	1990	0.38	0.81	0.92	0.08	0.79	0.88	1.03	1.55
Switzerland	1996	0.35	0.81	0.91	0.01	0.78	0.88	1.03	1.53
United States	1985	0.37	0.81	0.92	0.07	0.79	0.88	1.03	1.54
Japan	1996	0.46	0.82	0.92	0.25	0.80	0.88	1.03	1.63
Switzerland	1999	0.33	0.81	0.91	-0.03	0.78	0.88	1.03	1.52
Belgium	1996	0.40	0.81	0.92	0.12	0.79	0.88	1.03	1.56
Belgium	1993	0.38	0.81	0.92	0.08	0.79	0.88	1.03	1.55
Japan	1993	0.44	0.82	0.92	0.22	0.80	0.88	1.03	1.61
Cyprus	1999	0.29	0.80	0.91	-0.13	0.78	0.88	1.03	1.49
Luxembourg	1990	0.42	0.81	0.92	0.17	0.79	0.88	1.03	1.59
Germany	1996	0.45	0.82	0.92	0.24	0.80	0.88	1.03	1.62
Canada	1996	0.41	0.81	0.92	0.16	0.79	0.88	1.03	1.58
Germany	1993	0.47	0.82	0.92	0.26	0.80	0.88	1.03	1.64
Canada	1993	0.44	0.82	0.92	0.22	0.80	0.88	1.03	1.61
Australia	1996	0.40	0.81	0.92	0.14	0.79	0.88	1.03	1.57
France	1993	0.43	0.82	0.92	0.20	0.79	0.88	1.03	1.60
Iceland	1996	0.42	0.81	0.92	0.18	0.79	0.88	1.03	1.59
Switzerland	1990	0.38	0.81	0.92	0.09	0.79	0.88	1.03	1.55

Note: Countries were sorted by real income per capita.

Table 7.2. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Austria	1999	0.40	0.81	0.92	0.13	0.79	0.88	1.03	1.57
Netherlands	1996	0.47	0.82	0.92	0.27	0.80	0.88	1.03	1.65
Italy	1993	0.41	0.81	0.92	0.15	0.79	0.88	1.03	1.57
Netherlands	1993	0.50	0.82	0.92	0.33	0.80	0.89	1.03	1.70
Austria	1993	0.41	0.81	0.92	0.15	0.79	0.88	1.03	1.57
Iceland	1999	0.41	0.81	0.92	0.14	0.79	0.88	1.03	1.57
Austria	1996	0.40	0.81	0.92	0.14	0.79	0.88	1.03	1.57
Italy	1999	0.42	0.81	0.92	0.16	0.79	0.88	1.03	1.58
Italy	1996	0.43	0.81	0.92	0.19	0.79	0.88	1.03	1.59
Denmark	1996	0.46	0.82	0.92	0.25	0.80	0.88	1.03	1.63
France	1996	0.42	0.81	0.92	0.18	0.79	0.88	1.03	1.59
Australia	1993	0.42	0.81	0.92	0.16	0.79	0.88	1.03	1.58
Italy	1990	0.39	0.81	0.92	0.11	0.79	0.88	1.03	1.56
Iceland	1993	0.45	0.82	0.92	0.24	0.80	0.88	1.03	1.62
Germany	1990	0.46	0.82	0.92	0.26	0.80	0.88	1.03	1.64
France	1990	0.44	0.82	0.92	0.22	0.80	0.88	1.03	1.61
Canada	1999	0.47	0.82	0.92	0.28	0.80	0.88	1.03	1.65
Canada	1985	0.47	0.82	0.92	0.27	0.80	0.88	1.03	1.65
United Kingdom	1996	0.45	0.82	0.92	0.23	0.80	0.88	1.03	1.62
Denmark	1999	0.44	0.82	0.92	0.21	0.80	0.88	1.03	1.61
United Kingdom	1993	0.42	0.81	0.92	0.18	0.79	0.88	1.03	1.59
Denmark	1993	0.46	0.82	0.92	0.26	0.80	0.88	1.03	1.64
Germany	1999	0.44	0.82	0.92	0.20	0.79	0.88	1.03	1.60
Australia	1999	0.43	0.82	0.92	0.20	0.79	0.88	1.03	1.60
Norway	1996	0.49	0.82	0.92	0.31	0.80	0.89	1.03	1.68

Note: Countries were sorted by real income per capita.

Table 7.2. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United Kingdom	1999	0.42	0.81	0.92	0.16	0.79	0.88	1.03	1.58
Norway	1999	0.48	0.82	0.92	0.30	0.80	0.88	1.03	1.67
Canada	1990	0.48	0.82	0.92	0.28	0.80	0.88	1.03	1.65
New Zealand	1996	0.42	0.81	0.92	0.17	0.79	0.88	1.03	1.58
Belgium	1990	0.45	0.82	0.92	0.22	0.80	0.88	1.03	1.61
Norway	1993	0.48	0.82	0.92	0.29	0.80	0.88	1.03	1.66
France	1999	0.44	0.82	0.92	0.22	0.80	0.88	1.03	1.61
Belgium	1999	0.46	0.82	0.92	0.26	0.80	0.88	1.03	1.64
Japan	1990	0.46	0.82	0.92	0.25	0.80	0.88	1.03	1.63
Netherlands	1999	0.47	0.82	0.92	0.26	0.80	0.88	1.03	1.64
Austria	1990	0.44	0.82	0.92	0.20	0.79	0.88	1.03	1.60
New Zealand	1993	0.47	0.82	0.92	0.26	0.80	0.88	1.03	1.64
Iceland	1990	0.48	0.82	0.92	0.29	0.80	0.88	1.03	1.67
United Kingdom	1990	0.42	0.81	0.92	0.16	0.79	0.88	1.03	1.58
Denmark	1990	0.50	0.82	0.92	0.32	0.80	0.89	1.03	1.69
Netherlands	1990	0.50	0.82	0.92	0.32	0.80	0.89	1.03	1.69
Luxembourg	1985	0.44	0.82	0.92	0.21	0.79	0.88	1.03	1.60
Spain	1996	0.35	0.81	0.91	0.02	0.78	0.88	1.03	1.53
Japan	1999	0.50	0.82	0.92	0.32	0.80	0.89	1.03	1.69
Israel	1996	0.51	0.82	0.92	0.34	0.80	0.89	1.03	1.71
Australia	1990	0.45	0.82	0.92	0.24	0.80	0.88	1.03	1.62
Sweden	1996	0.52	0.83	0.92	0.36	0.81	0.89	1.03	1.74
Sweden	1993	0.53	0.83	0.92	0.37	0.81	0.89	1.03	1.76
Spain	1999	0.34	0.81	0.91	0.00	0.78	0.88	1.03	1.52
Ireland	1999	0.41	0.81	0.92	0.15	0.79	0.88	1.03	1.57

Note: Countries were sorted by real income per capita.

Table 7.2. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
New Zealand	1999	0.46	0.82	0.92	0.26	0.80	0.88	1.03	1.64
Sweden	1990	0.54	0.83	0.92	0.40	0.81	0.89	1.03	1.80
France	1985	0.44	0.82	0.92	0.21	0.79	0.88	1.03	1.60
Ireland	1996	0.46	0.82	0.92	0.25	0.80	0.88	1.03	1.63
Germany	1985	0.49	0.82	0.92	0.31	0.80	0.89	1.03	1.69
Sweden	1999	0.52	0.83	0.92	0.36	0.81	0.89	1.03	1.74
Finland	1996	0.51	0.82	0.92	0.34	0.81	0.89	1.03	1.72
Portugal	1996	0.39	0.81	0.92	0.11	0.79	0.88	1.03	1.56
Spain	1993	0.35	0.81	0.91	0.02	0.78	0.88	1.03	1.53
Greece	1999	0.41	0.81	0.92	0.15	0.79	0.88	1.03	1.58
Portugal	1999	0.46	0.82	0.92	0.25	0.80	0.88	1.03	1.63
Portugal	1993	0.38	0.81	0.92	0.09	0.79	0.88	1.03	1.55
Greece	1996	0.42	0.81	0.92	0.16	0.79	0.88	1.03	1.58
Finland	1993	0.52	0.83	0.92	0.35	0.81	0.89	1.03	1.73
Italy	1985	0.43	0.82	0.92	0.20	0.79	0.88	1.03	1.60
Australia	1985	0.45	0.82	0.92	0.24	0.80	0.88	1.03	1.62
Japan	1985	0.53	0.83	0.92	0.37	0.81	0.89	1.03	1.76
Belgium	1985	0.47	0.82	0.92	0.27	0.80	0.88	1.03	1.65
New Zealand	1990	0.51	0.82	0.92	0.34	0.80	0.89	1.03	1.71
Greece	1993	0.34	0.81	0.91	0.00	0.78	0.88	1.03	1.52
Netherlands	1985	0.51	0.82	0.92	0.33	0.80	0.89	1.03	1.71
Finland	1990	0.51	0.82	0.92	0.35	0.81	0.89	1.03	1.72
Finland	1999	0.48	0.82	0.92	0.29	0.80	0.88	1.03	1.67
Ireland	1993	0.47	0.82	0.92	0.26	0.80	0.88	1.03	1.64
Denmark	1985	0.51	0.82	0.92	0.33	0.80	0.89	1.03	1.71

Note: Countries were sorted by real income per capita.

Table 7.2. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Norway	1990	0.53	0.83	0.92	0.38	0.81	0.89	1.03	1.76
United Kingdom	1985	0.47	0.82	0.92	0.28	0.80	0.88	1.03	1.65
Israel	1999	0.52	0.83	0.92	0.36	0.81	0.89	1.03	1.74
New Zealand	1985	0.51	0.82	0.92	0.33	0.80	0.89	1.03	1.71
Sweden	1985	0.56	0.83	0.92	0.42	0.81	0.89	1.03	1.85
Spain	1990	0.43	0.81	0.92	0.19	0.79	0.88	1.03	1.59
Norway	1985	0.54	0.83	0.92	0.40	0.81	0.89	1.03	1.80
Austria	1985	0.48	0.82	0.92	0.28	0.80	0.88	1.03	1.66
Slovenia	1996	0.51	0.82	0.92	0.34	0.81	0.89	1.03	1.72
Slovenia	1999	0.53	0.83	0.92	0.37	0.81	0.89	1.03	1.76
Czech Republic	1996	0.53	0.83	0.92	0.37	0.81	0.89	1.03	1.76
Finland	1985	0.52	0.83	0.92	0.36	0.81	0.89	1.03	1.73
Spain	1985	0.46	0.82	0.92	0.25	0.80	0.88	1.03	1.63
Korea	1999	0.58	0.83	0.92	0.47	0.82	0.89	1.03	1.97
Czech Republic	1999	0.50	0.82	0.92	0.33	0.80	0.89	1.03	1.71
Portugal	1990	0.48	0.82	0.92	0.29	0.80	0.88	1.03	1.67
Ireland	1990	0.49	0.82	0.92	0.30	0.80	0.88	1.03	1.68
Greece	1990	0.49	0.82	0.92	0.31	0.80	0.88	1.03	1.68
Hungary	1996	0.59	0.84	0.92	0.47	0.82	0.89	1.03	1.98
Mexico	1996	0.56	0.83	0.92	0.44	0.81	0.89	1.03	1.88
Estonia	1999	0.58	0.83	0.92	0.46	0.82	0.89	1.03	1.95
Hungary	1999	0.58	0.83	0.92	0.46	0.82	0.89	1.03	1.93
Greece	1985	0.50	0.82	0.92	0.32	0.80	0.89	1.03	1.69
Slovak Republic	1999	0.55	0.83	0.92	0.40	0.81	0.89	1.03	1.81
Slovak Republic	1996	0.58	0.83	0.92	0.47	0.82	0.89	1.03	1.97

Note: Countries were sorted by real income per capita.

Table 7.2. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Lithuania	1999	0.59	0.84	0.92	0.48	0.82	0.89	1.03	2.02
Mexico	1999	0.58	0.83	0.92	0.46	0.82	0.89	1.03	1.94
Poland	1999	0.59	0.84	0.92	0.47	0.82	0.89	1.03	1.99
Poland	1996	0.61	0.84	0.92	0.51	0.82	0.89	1.03	2.13
Ireland	1985	0.54	0.83	0.92	0.39	0.81	0.89	1.03	1.79
Bulgaria	1999	0.67	0.85	0.92	0.61	0.84	0.90	1.03	3.62
Russian Federation	1996	0.65	0.85	0.92	0.57	0.83	0.90	1.03	2.65
Croatia	1999	0.59	0.84	0.92	0.48	0.82	0.89	1.03	2.03
Portugal	1985	0.59	0.84	0.92	0.48	0.82	0.89	1.03	2.00
Latvia	1999	0.63	0.84	0.92	0.54	0.83	0.89	1.03	2.38
Turkey	1999	0.61	0.84	0.92	0.50	0.82	0.89	1.03	2.12
Macedonia	1999	0.60	0.84	0.92	0.49	0.82	0.89	1.03	2.04
Russian Federation	1999	0.66	0.85	0.92	0.59	0.83	0.90	1.03	3.05
Romania	1999	0.64	0.85	0.92	0.56	0.83	0.90	1.03	2.61
Ukraine	1999	0.69	0.85	0.93	0.63	0.84	0.90	1.03	6.03
Average		0.47	0.82	0.92	0.26	0.80	0.88	1.03	1.74

Note: Countries were sorted by real income per capita.

Table 7.3. Unconditional income elasticities for food subgroups, pooled data

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	1999	0.07	0.32	0.37	-0.17	0.31	0.35	0.41	0.59
Luxembourg	1993	0.12	0.33	0.37	-0.04	0.32	0.36	0.42	0.61
United States	1996	0.13	0.33	0.37	-0.02	0.32	0.36	0.42	0.61
Luxembourg	1996	0.11	0.33	0.38	-0.08	0.32	0.36	0.42	0.61
United States	1993	0.15	0.34	0.38	0.01	0.33	0.37	0.43	0.64
United States	1999	0.15	0.34	0.39	0.02	0.33	0.37	0.44	0.65
Switzerland	1993	0.18	0.39	0.44	0.04	0.38	0.42	0.49	0.74
United States	1990	0.18	0.39	0.44	0.04	0.38	0.42	0.49	0.74
Switzerland	1996	0.17	0.39	0.44	0.01	0.38	0.43	0.50	0.74
United States	1985	0.18	0.40	0.45	0.04	0.39	0.43	0.50	0.76
Japan	1996	0.23	0.41	0.46	0.13	0.40	0.44	0.51	0.81
Switzerland	1999	0.17	0.40	0.46	-0.01	0.39	0.44	0.51	0.75
Belgium	1996	0.20	0.41	0.46	0.06	0.40	0.44	0.52	0.78
Belgium	1993	0.19	0.41	0.46	0.04	0.40	0.44	0.52	0.78
Japan	1993	0.22	0.41	0.46	0.11	0.40	0.45	0.52	0.81
Cyprus	1999	0.15	0.41	0.46	-0.07	0.39	0.44	0.52	0.76
Luxembourg	1990	0.21	0.41	0.46	0.09	0.40	0.45	0.52	0.80
Germany	1996	0.23	0.42	0.47	0.12	0.40	0.45	0.52	0.82
Canada	1996	0.21	0.42	0.47	0.08	0.41	0.45	0.53	0.81
Germany	1993	0.24	0.42	0.47	0.14	0.41	0.45	0.53	0.84
Canada	1993	0.23	0.42	0.47	0.11	0.41	0.45	0.53	0.83
Australia	1996	0.21	0.42	0.47	0.07	0.41	0.45	0.53	0.81
France	1993	0.22	0.42	0.47	0.10	0.41	0.45	0.53	0.82
Iceland	1996	0.22	0.42	0.47	0.09	0.41	0.46	0.53	0.82
Switzerland	1990	0.20	0.42	0.48	0.05	0.41	0.46	0.53	0.80

Note: Countries were sorted by real income per capita.

Table 7.3. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Austria	1999	0.21	0.42	0.48	0.07	0.41	0.46	0.53	0.81
Netherlands	1996	0.25	0.43	0.48	0.14	0.42	0.46	0.53	0.86
Italy	1993	0.21	0.42	0.48	0.08	0.41	0.46	0.54	0.82
Netherlands	1993	0.26	0.43	0.48	0.17	0.42	0.46	0.54	0.89
Austria	1993	0.21	0.43	0.48	0.08	0.41	0.46	0.54	0.82
Iceland	1999	0.21	0.43	0.48	0.08	0.41	0.46	0.54	0.82
Austria	1996	0.21	0.43	0.48	0.07	0.41	0.46	0.54	0.82
Italy	1999	0.22	0.43	0.48	0.09	0.42	0.46	0.54	0.83
Italy	1996	0.23	0.43	0.48	0.10	0.42	0.46	0.54	0.84
Denmark	1996	0.24	0.43	0.48	0.13	0.42	0.46	0.54	0.86
France	1996	0.22	0.43	0.48	0.09	0.42	0.47	0.54	0.84
Australia	1993	0.22	0.43	0.48	0.08	0.42	0.47	0.54	0.84
Italy	1990	0.21	0.44	0.49	0.06	0.42	0.47	0.55	0.84
Iceland	1993	0.24	0.44	0.49	0.13	0.43	0.47	0.55	0.87
Germany	1990	0.25	0.44	0.49	0.14	0.43	0.48	0.55	0.88
France	1990	0.24	0.44	0.49	0.12	0.43	0.48	0.55	0.87
Canada	1999	0.26	0.44	0.49	0.15	0.43	0.48	0.55	0.89
Canada	1985	0.26	0.44	0.50	0.15	0.43	0.48	0.56	0.89
United Kingdom	1996	0.24	0.44	0.50	0.12	0.43	0.48	0.56	0.87
Denmark	1999	0.24	0.44	0.50	0.11	0.43	0.48	0.56	0.87
United Kingdom	1993	0.23	0.44	0.50	0.10	0.43	0.48	0.56	0.86
Denmark	1993	0.25	0.44	0.50	0.14	0.43	0.48	0.56	0.89
Germany	1999	0.24	0.44	0.50	0.11	0.43	0.48	0.56	0.87
Australia	1999	0.24	0.44	0.50	0.11	0.43	0.48	0.56	0.87
Norway	1996	0.27	0.45	0.50	0.17	0.44	0.48	0.56	0.92

Note: Countries were sorted by real income per capita.

Table 7.3. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United Kingdom	1999	0.23	0.44	0.50	0.09	0.43	0.48	0.56	0.86
Norway	1999	0.26	0.45	0.50	0.16	0.44	0.48	0.56	0.91
Canada	1990	0.26	0.45	0.50	0.15	0.44	0.48	0.56	0.91
New Zealand	1996	0.23	0.45	0.50	0.09	0.43	0.48	0.56	0.87
Belgium	1990	0.24	0.45	0.50	0.12	0.44	0.49	0.57	0.89
Norway	1993	0.27	0.45	0.51	0.16	0.44	0.49	0.57	0.92
France	1999	0.24	0.45	0.51	0.12	0.44	0.49	0.57	0.89
Belgium	1999	0.26	0.45	0.51	0.14	0.44	0.49	0.57	0.90
Japan	1990	0.26	0.45	0.51	0.14	0.44	0.49	0.57	0.90
Netherlands	1999	0.26	0.46	0.51	0.15	0.44	0.49	0.57	0.91
Austria	1990	0.24	0.46	0.51	0.11	0.44	0.49	0.57	0.89
New Zealand	1993	0.26	0.46	0.51	0.15	0.45	0.49	0.57	0.92
Iceland	1990	0.27	0.46	0.51	0.16	0.45	0.49	0.57	0.93
United Kingdom	1990	0.23	0.46	0.51	0.09	0.44	0.49	0.58	0.89
Denmark	1990	0.28	0.46	0.52	0.18	0.45	0.50	0.58	0.95
Netherlands	1990	0.28	0.46	0.52	0.18	0.45	0.50	0.58	0.96
Luxembourg	1985	0.25	0.46	0.52	0.12	0.45	0.50	0.58	0.91
Spain	1996	0.20	0.46	0.52	0.01	0.44	0.50	0.58	0.86
Japan	1999	0.28	0.47	0.52	0.18	0.46	0.50	0.58	0.96
Israel	1996	0.29	0.47	0.52	0.19	0.46	0.50	0.58	0.97
Australia	1990	0.26	0.46	0.52	0.13	0.45	0.50	0.58	0.92
Sweden	1996	0.30	0.47	0.52	0.21	0.46	0.50	0.58	0.99
Sweden	1993	0.30	0.47	0.52	0.21	0.46	0.51	0.59	1.00
Spain	1999	0.20	0.46	0.52	0.00	0.45	0.50	0.59	0.87
Ireland	1999	0.23	0.46	0.52	0.08	0.45	0.50	0.59	0.90

Note: Countries were sorted by real income per capita.

Table 7.3. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
New Zealand	1999	0.27	0.47	0.53	0.15	0.46	0.51	0.59	0.94
Sweden	1990	0.31	0.48	0.53	0.23	0.47	0.51	0.59	1.04
France	1985	0.25	0.47	0.53	0.12	0.46	0.51	0.59	0.92
Ireland	1996	0.27	0.47	0.53	0.14	0.46	0.51	0.59	0.94
Germany	1985	0.29	0.47	0.53	0.18	0.46	0.51	0.59	0.97
Sweden	1999	0.30	0.48	0.53	0.21	0.47	0.51	0.59	1.01
Finland	1996	0.30	0.48	0.53	0.20	0.47	0.51	0.59	0.99
Portugal	1996	0.23	0.47	0.53	0.06	0.46	0.51	0.59	0.90
Spain	1993	0.20	0.47	0.53	0.01	0.45	0.51	0.60	0.89
Greece	1999	0.24	0.47	0.53	0.09	0.46	0.51	0.60	0.91
Portugal	1999	0.27	0.48	0.53	0.14	0.46	0.51	0.60	0.95
Portugal	1993	0.22	0.47	0.53	0.05	0.46	0.51	0.60	0.90
Greece	1996	0.24	0.47	0.53	0.09	0.46	0.51	0.60	0.92
Finland	1993	0.30	0.48	0.53	0.21	0.47	0.52	0.60	1.01
Italy	1985	0.25	0.48	0.53	0.12	0.46	0.51	0.60	0.93
Australia	1985	0.26	0.48	0.53	0.14	0.46	0.51	0.60	0.95
Japan	1985	0.31	0.48	0.54	0.22	0.47	0.52	0.60	1.03
Belgium	1985	0.27	0.48	0.54	0.16	0.47	0.52	0.60	0.96
New Zealand	1990	0.30	0.48	0.54	0.20	0.47	0.52	0.60	1.00
Greece	1993	0.20	0.47	0.54	0.00	0.46	0.52	0.60	0.89
Netherlands	1985	0.30	0.49	0.54	0.20	0.47	0.52	0.61	1.01
Finland	1990	0.30	0.49	0.54	0.20	0.48	0.52	0.61	1.02
Finland	1999	0.28	0.48	0.54	0.17	0.47	0.52	0.61	0.98
Ireland	1993	0.28	0.48	0.54	0.16	0.47	0.52	0.61	0.97
Denmark	1985	0.30	0.49	0.55	0.20	0.48	0.53	0.61	1.01

Note: Countries were sorted by real income per capita.

Table 7.3. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Norway	1990	0.32	0.49	0.55	0.22	0.48	0.53	0.61	1.05
United Kingdom	1985	0.28	0.49	0.55	0.17	0.48	0.53	0.62	0.99
Israel	1999	0.31	0.50	0.55	0.22	0.48	0.53	0.62	1.04
New Zealand	1985	0.31	0.50	0.55	0.20	0.49	0.54	0.62	1.03
Sweden	1985	0.34	0.50	0.56	0.26	0.49	0.54	0.62	1.12
Spain	1990	0.26	0.49	0.55	0.11	0.48	0.53	0.62	0.96
Norway	1985	0.33	0.50	0.56	0.24	0.49	0.54	0.62	1.09
Austria	1985	0.29	0.50	0.56	0.17	0.48	0.54	0.62	1.00
Slovenia	1996	0.31	0.50	0.56	0.21	0.49	0.54	0.62	1.05
Slovenia	1999	0.32	0.51	0.57	0.23	0.50	0.55	0.63	1.08
Czech Republic	1996	0.33	0.51	0.57	0.23	0.50	0.55	0.64	1.09
Finland	1985	0.32	0.51	0.57	0.22	0.50	0.55	0.64	1.08
Spain	1985	0.29	0.51	0.57	0.15	0.50	0.55	0.64	1.02
Korea	1999	0.37	0.52	0.58	0.29	0.51	0.56	0.64	1.23
Czech Republic	1999	0.32	0.52	0.58	0.21	0.51	0.56	0.65	1.07
Portugal	1990	0.31	0.52	0.58	0.18	0.51	0.56	0.65	1.05
Ireland	1990	0.31	0.53	0.59	0.19	0.51	0.57	0.66	1.07
Greece	1990	0.31	0.53	0.59	0.20	0.52	0.57	0.66	1.08
Hungary	1996	0.38	0.54	0.60	0.31	0.53	0.58	0.67	1.29
Mexico	1996	0.37	0.55	0.60	0.29	0.53	0.58	0.67	1.23
Estonia	1999	0.38	0.55	0.60	0.30	0.54	0.58	0.67	1.28
Hungary	1999	0.38	0.55	0.60	0.30	0.54	0.58	0.68	1.27
Greece	1985	0.33	0.54	0.60	0.21	0.53	0.58	0.68	1.11
Slovak Republic	1999	0.36	0.55	0.60	0.27	0.53	0.58	0.68	1.19
Slovak Republic	1996	0.39	0.56	0.61	0.31	0.54	0.59	0.68	1.31

Note: Countries were sorted by real income per capita.

Table 7.3. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Lithuania	1999	0.39	0.56	0.61	0.32	0.55	0.59	0.69	1.35
Mexico	1999	0.39	0.56	0.61	0.31	0.55	0.59	0.69	1.29
Poland	1999	0.39	0.56	0.62	0.32	0.55	0.60	0.69	1.33
Poland	1996	0.41	0.56	0.62	0.34	0.55	0.60	0.69	1.42
Ireland	1985	0.36	0.56	0.62	0.26	0.54	0.60	0.69	1.20
Bulgaria	1999	0.45	0.57	0.62	0.41	0.56	0.60	0.69	2.43
Russian Federation	1996	0.44	0.57	0.62	0.38	0.56	0.61	0.70	1.79
Croatia	1999	0.40	0.57	0.63	0.33	0.56	0.61	0.70	1.38
Portugal	1985	0.40	0.57	0.63	0.32	0.56	0.61	0.70	1.36
Latvia	1999	0.43	0.58	0.63	0.37	0.57	0.61	0.70	1.63
Turkey	1999	0.42	0.58	0.64	0.35	0.57	0.62	0.71	1.46
Macedonia	1999	0.41	0.58	0.64	0.34	0.57	0.62	0.71	1.41
Russian Federation	1999	0.47	0.61	0.66	0.42	0.60	0.64	0.73	2.18
Romania	1999	0.46	0.60	0.66	0.40	0.59	0.64	0.73	1.87
Ukraine	1999	0.50	0.62	0.68	0.46	0.61	0.66	0.75	4.40
Average		0.27	0.47	0.52	0.16	0.46	0.50	0.59	1.01

Note: Countries were sorted by real income per capita.

Table 7.4. Unconditional Frisch own-price elasticities for food subgroups, pooled data

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	1999	-0.06	-0.25	-0.29	0.13	-0.24	-0.28	-0.32	-0.46
Luxembourg	1993	-0.10	-0.26	-0.29	0.03	-0.25	-0.28	-0.33	-0.48
United States	1996	-0.10	-0.26	-0.29	0.02	-0.25	-0.28	-0.33	-0.48
Luxembourg	1996	-0.08	-0.26	-0.29	0.06	-0.25	-0.28	-0.33	-0.48
United States	1993	-0.12	-0.27	-0.30	-0.01	-0.26	-0.29	-0.34	-0.50
United States	1999	-0.12	-0.27	-0.30	-0.01	-0.26	-0.29	-0.34	-0.51
Switzerland	1993	-0.14	-0.30	-0.34	-0.03	-0.29	-0.33	-0.38	-0.58
United States	1990	-0.14	-0.31	-0.34	-0.03	-0.30	-0.33	-0.39	-0.58
Switzerland	1996	-0.13	-0.31	-0.35	0.00	-0.30	-0.33	-0.39	-0.58
United States	1985	-0.14	-0.31	-0.35	-0.03	-0.30	-0.34	-0.39	-0.59
Japan	1996	-0.18	-0.32	-0.36	-0.10	-0.31	-0.34	-0.40	-0.64
Switzerland	1999	-0.13	-0.31	-0.36	0.01	-0.31	-0.34	-0.40	-0.59
Belgium	1996	-0.16	-0.32	-0.36	-0.05	-0.31	-0.35	-0.40	-0.61
Belgium	1993	-0.15	-0.32	-0.36	-0.03	-0.31	-0.35	-0.41	-0.61
Japan	1993	-0.18	-0.32	-0.36	-0.09	-0.32	-0.35	-0.41	-0.64
Cyprus	1999	-0.11	-0.32	-0.36	0.05	-0.31	-0.35	-0.41	-0.59
Luxembourg	1990	-0.17	-0.32	-0.36	-0.07	-0.31	-0.35	-0.41	-0.63
Germany	1996	-0.18	-0.33	-0.36	-0.09	-0.32	-0.35	-0.41	-0.65
Canada	1996	-0.17	-0.33	-0.37	-0.06	-0.32	-0.35	-0.41	-0.63
Germany	1993	-0.19	-0.33	-0.37	-0.11	-0.32	-0.36	-0.41	-0.66
Canada	1993	-0.18	-0.33	-0.37	-0.09	-0.32	-0.35	-0.41	-0.65
Australia	1996	-0.16	-0.33	-0.37	-0.05	-0.32	-0.36	-0.41	-0.63
France	1993	-0.18	-0.33	-0.37	-0.08	-0.32	-0.36	-0.41	-0.65
Iceland	1996	-0.17	-0.33	-0.37	-0.07	-0.32	-0.36	-0.42	-0.64
Switzerland	1990	-0.16	-0.33	-0.37	-0.04	-0.32	-0.36	-0.42	-0.63

Note: Countries were sorted by real income per capita.

Table 7.4. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Austria	1999	-0.16	-0.33	-0.37	-0.05	-0.32	-0.36	-0.42	-0.64
Netherlands	1996	-0.19	-0.33	-0.37	-0.11	-0.33	-0.36	-0.42	-0.67
Italy	1993	-0.17	-0.33	-0.37	-0.06	-0.32	-0.36	-0.42	-0.64
Netherlands	1993	-0.21	-0.34	-0.38	-0.14	-0.33	-0.36	-0.42	-0.70
Austria	1993	-0.17	-0.33	-0.38	-0.06	-0.32	-0.36	-0.42	-0.65
Iceland	1999	-0.17	-0.33	-0.38	-0.06	-0.32	-0.36	-0.42	-0.65
Austria	1996	-0.17	-0.33	-0.38	-0.06	-0.32	-0.36	-0.42	-0.64
Italy	1999	-0.17	-0.33	-0.38	-0.07	-0.33	-0.36	-0.42	-0.65
Italy	1996	-0.18	-0.33	-0.38	-0.08	-0.33	-0.36	-0.42	-0.66
Denmark	1996	-0.19	-0.34	-0.38	-0.10	-0.33	-0.36	-0.42	-0.67
France	1996	-0.17	-0.34	-0.38	-0.07	-0.33	-0.36	-0.42	-0.66
Australia	1993	-0.17	-0.34	-0.38	-0.07	-0.33	-0.37	-0.43	-0.65
Italy	1990	-0.17	-0.34	-0.38	-0.05	-0.33	-0.37	-0.43	-0.66
Iceland	1993	-0.19	-0.34	-0.39	-0.10	-0.34	-0.37	-0.43	-0.68
Germany	1990	-0.20	-0.35	-0.39	-0.11	-0.34	-0.37	-0.43	-0.69
France	1990	-0.19	-0.34	-0.39	-0.09	-0.34	-0.37	-0.43	-0.68
Canada	1999	-0.20	-0.35	-0.39	-0.12	-0.34	-0.37	-0.43	-0.70
Canada	1985	-0.20	-0.35	-0.39	-0.12	-0.34	-0.37	-0.44	-0.70
United Kingdom	1996	-0.19	-0.35	-0.39	-0.10	-0.34	-0.37	-0.44	-0.69
Denmark	1999	-0.19	-0.35	-0.39	-0.09	-0.34	-0.37	-0.44	-0.68
United Kingdom	1993	-0.18	-0.35	-0.39	-0.08	-0.34	-0.37	-0.44	-0.68
Denmark	1993	-0.20	-0.35	-0.39	-0.11	-0.34	-0.38	-0.44	-0.70
Germany	1999	-0.19	-0.35	-0.39	-0.09	-0.34	-0.38	-0.44	-0.68
Australia	1999	-0.19	-0.35	-0.39	-0.08	-0.34	-0.38	-0.44	-0.68
Norway	1996	-0.21	-0.35	-0.39	-0.13	-0.34	-0.38	-0.44	-0.72

Note: Countries were sorted by real income per capita.

Table 7.4. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United Kingdom	1999	-0.18	-0.35	-0.39	-0.07	-0.34	-0.38	-0.44	-0.68
Norway	1999	-0.21	-0.35	-0.39	-0.13	-0.34	-0.38	-0.44	-0.71
Canada	1990	-0.20	-0.35	-0.39	-0.12	-0.34	-0.38	-0.44	-0.71
New Zealand	1996	-0.18	-0.35	-0.39	-0.07	-0.34	-0.38	-0.44	-0.68
Belgium	1990	-0.19	-0.35	-0.39	-0.09	-0.34	-0.38	-0.44	-0.69
Norway	1993	-0.21	-0.35	-0.40	-0.12	-0.35	-0.38	-0.44	-0.72
France	1999	-0.19	-0.35	-0.40	-0.09	-0.34	-0.38	-0.44	-0.70
Belgium	1999	-0.20	-0.35	-0.40	-0.11	-0.35	-0.38	-0.44	-0.71
Japan	1990	-0.20	-0.36	-0.40	-0.11	-0.35	-0.38	-0.45	-0.71
Netherlands	1999	-0.20	-0.36	-0.40	-0.11	-0.35	-0.38	-0.45	-0.72
Austria	1990	-0.19	-0.36	-0.40	-0.09	-0.35	-0.39	-0.45	-0.70
New Zealand	1993	-0.20	-0.36	-0.40	-0.12	-0.35	-0.39	-0.45	-0.72
Iceland	1990	-0.21	-0.36	-0.40	-0.13	-0.35	-0.39	-0.45	-0.73
United Kingdom	1990	-0.18	-0.36	-0.40	-0.07	-0.35	-0.39	-0.45	-0.69
Denmark	1990	-0.22	-0.36	-0.40	-0.14	-0.35	-0.39	-0.45	-0.74
Netherlands	1990	-0.22	-0.36	-0.41	-0.14	-0.36	-0.39	-0.45	-0.75
Luxembourg	1985	-0.19	-0.36	-0.41	-0.09	-0.35	-0.39	-0.46	-0.71
Spain	1996	-0.16	-0.36	-0.41	-0.01	-0.35	-0.39	-0.46	-0.68
Japan	1999	-0.22	-0.37	-0.41	-0.14	-0.36	-0.39	-0.46	-0.75
Israel	1996	-0.23	-0.37	-0.41	-0.15	-0.36	-0.39	-0.46	-0.76
Australia	1990	-0.20	-0.36	-0.41	-0.11	-0.35	-0.39	-0.46	-0.72
Sweden	1996	-0.23	-0.37	-0.41	-0.16	-0.36	-0.39	-0.46	-0.78
Sweden	1993	-0.24	-0.37	-0.41	-0.17	-0.36	-0.40	-0.46	-0.78
Spain	1999	-0.15	-0.36	-0.41	0.00	-0.35	-0.39	-0.46	-0.68
Ireland	1999	-0.18	-0.36	-0.41	-0.07	-0.35	-0.39	-0.46	-0.70

Note: Countries were sorted by real income per capita.

Table 7.4. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
New Zealand	1999	-0.21	-0.37	-0.41	-0.12	-0.36	-0.40	-0.46	-0.74
Sweden	1990	-0.24	-0.37	-0.41	-0.18	-0.37	-0.40	-0.46	-0.81
France	1985	-0.20	-0.37	-0.41	-0.09	-0.36	-0.40	-0.46	-0.72
Ireland	1996	-0.21	-0.37	-0.41	-0.11	-0.36	-0.40	-0.46	-0.74
Germany	1985	-0.22	-0.37	-0.41	-0.14	-0.36	-0.40	-0.46	-0.76
Sweden	1999	-0.24	-0.37	-0.42	-0.16	-0.37	-0.40	-0.47	-0.79
Finland	1996	-0.23	-0.37	-0.42	-0.16	-0.36	-0.40	-0.47	-0.78
Portugal	1996	-0.18	-0.37	-0.42	-0.05	-0.36	-0.40	-0.47	-0.71
Spain	1993	-0.16	-0.37	-0.42	-0.01	-0.36	-0.40	-0.47	-0.69
Greece	1999	-0.19	-0.37	-0.42	-0.07	-0.36	-0.40	-0.47	-0.72
Portugal	1999	-0.21	-0.37	-0.42	-0.11	-0.36	-0.40	-0.47	-0.74
Portugal	1993	-0.17	-0.37	-0.42	-0.04	-0.36	-0.40	-0.47	-0.71
Greece	1996	-0.19	-0.37	-0.42	-0.07	-0.36	-0.40	-0.47	-0.72
Finland	1993	-0.24	-0.38	-0.42	-0.16	-0.37	-0.40	-0.47	-0.79
Italy	1985	-0.20	-0.37	-0.42	-0.09	-0.36	-0.40	-0.47	-0.73
Australia	1985	-0.21	-0.37	-0.42	-0.11	-0.36	-0.40	-0.47	-0.74
Japan	1985	-0.24	-0.38	-0.42	-0.17	-0.37	-0.41	-0.47	-0.80
Belgium	1985	-0.22	-0.38	-0.42	-0.12	-0.37	-0.40	-0.47	-0.75
New Zealand	1990	-0.23	-0.38	-0.42	-0.15	-0.37	-0.41	-0.47	-0.78
Greece	1993	-0.16	-0.37	-0.42	0.00	-0.36	-0.40	-0.47	-0.70
Netherlands	1985	-0.23	-0.38	-0.42	-0.15	-0.37	-0.41	-0.47	-0.79
Finland	1990	-0.24	-0.38	-0.42	-0.16	-0.37	-0.41	-0.48	-0.80
Finland	1999	-0.22	-0.38	-0.42	-0.13	-0.37	-0.41	-0.48	-0.77
Ireland	1993	-0.22	-0.38	-0.42	-0.12	-0.37	-0.41	-0.48	-0.76
Denmark	1985	-0.24	-0.38	-0.43	-0.16	-0.37	-0.41	-0.48	-0.79

Note: Countries were sorted by real income per capita.

Table 7.4. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Norway	1990	-0.25	-0.39	-0.43	-0.18	-0.38	-0.41	-0.48	-0.82
United Kingdom	1985	-0.22	-0.38	-0.43	-0.13	-0.38	-0.41	-0.48	-0.77
Israel	1999	-0.24	-0.39	-0.43	-0.17	-0.38	-0.42	-0.48	-0.82
New Zealand	1985	-0.24	-0.39	-0.43	-0.16	-0.38	-0.42	-0.49	-0.81
Sweden	1985	-0.26	-0.39	-0.44	-0.20	-0.39	-0.42	-0.49	-0.88
Spain	1990	-0.20	-0.39	-0.43	-0.09	-0.38	-0.42	-0.49	-0.76
Norway	1985	-0.26	-0.39	-0.44	-0.19	-0.38	-0.42	-0.49	-0.85
Austria	1985	-0.23	-0.39	-0.44	-0.13	-0.38	-0.42	-0.49	-0.79
Slovenia	1996	-0.24	-0.39	-0.44	-0.16	-0.38	-0.42	-0.49	-0.82
Slovenia	1999	-0.25	-0.40	-0.44	-0.18	-0.39	-0.43	-0.50	-0.85
Czech Republic	1996	-0.26	-0.40	-0.45	-0.18	-0.39	-0.43	-0.50	-0.85
Finland	1985	-0.25	-0.40	-0.45	-0.17	-0.39	-0.43	-0.50	-0.84
Spain	1985	-0.22	-0.40	-0.45	-0.12	-0.39	-0.43	-0.50	-0.80
Korea	1999	-0.29	-0.41	-0.45	-0.23	-0.40	-0.44	-0.50	-0.97
Czech Republic	1999	-0.25	-0.40	-0.45	-0.16	-0.40	-0.44	-0.51	-0.84
Portugal	1990	-0.24	-0.41	-0.45	-0.14	-0.40	-0.44	-0.51	-0.83
Ireland	1990	-0.24	-0.41	-0.46	-0.15	-0.40	-0.44	-0.52	-0.84
Greece	1990	-0.25	-0.41	-0.46	-0.15	-0.40	-0.45	-0.52	-0.85
Hungary	1996	-0.30	-0.43	-0.47	-0.24	-0.42	-0.46	-0.53	-1.01
Mexico	1996	-0.29	-0.43	-0.47	-0.22	-0.42	-0.46	-0.53	-0.96
Estonia	1999	-0.30	-0.43	-0.47	-0.24	-0.42	-0.46	-0.53	-1.00
Hungary	1999	-0.30	-0.43	-0.47	-0.23	-0.42	-0.46	-0.53	-0.99
Greece	1985	-0.26	-0.42	-0.47	-0.16	-0.41	-0.46	-0.53	-0.87
Slovak Republic	1999	-0.28	-0.43	-0.47	-0.21	-0.42	-0.46	-0.53	-0.93
Slovak Republic	1996	-0.30	-0.43	-0.48	-0.24	-0.43	-0.46	-0.54	-1.03

Note: Countries were sorted by real income per capita.

Table 7.4. Continued

Country	Year	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Lithuania	1999	-0.31	-0.44	-0.48	-0.25	-0.43	-0.47	-0.54	-1.05
Mexico	1999	-0.30	-0.44	-0.48	-0.24	-0.43	-0.47	-0.54	-1.01
Poland	1999	-0.31	-0.44	-0.48	-0.25	-0.43	-0.47	-0.54	-1.04
Poland	1996	-0.32	-0.44	-0.48	-0.27	-0.43	-0.47	-0.54	-1.12
Ireland	1985	-0.28	-0.44	-0.48	-0.21	-0.43	-0.47	-0.54	-0.94
Bulgaria	1999	-0.35	-0.45	-0.49	-0.32	-0.44	-0.47	-0.54	-1.91
Russian Federation	1996	-0.34	-0.45	-0.49	-0.30	-0.44	-0.47	-0.54	-1.40
Croatia	1999	-0.32	-0.45	-0.49	-0.26	-0.44	-0.47	-0.55	-1.08
Portugal	1985	-0.31	-0.45	-0.49	-0.25	-0.44	-0.47	-0.55	-1.06
Latvia	1999	-0.34	-0.45	-0.50	-0.29	-0.44	-0.48	-0.55	-1.28
Turkey	1999	-0.33	-0.45	-0.50	-0.27	-0.44	-0.48	-0.56	-1.14
Macedonia	1999	-0.32	-0.45	-0.50	-0.26	-0.44	-0.48	-0.56	-1.10
Russian Federation	1999	-0.37	-0.47	-0.52	-0.33	-0.47	-0.50	-0.58	-1.71
Romania	1999	-0.36	-0.47	-0.52	-0.32	-0.46	-0.50	-0.58	-1.46
Ukraine	1999	-0.40	-0.49	-0.53	-0.36	-0.48	-0.51	-0.59	-3.45
Average		-0.21	-0.37	-0.41	-0.12	-0.36	-0.40	-0.46	-0.79

Note: Countries were sorted by real income per capita.

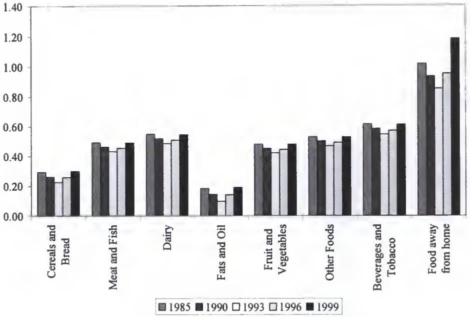

Figure 7.1. Average unconditional income elasticities of demand for food subgroups when data are pooled

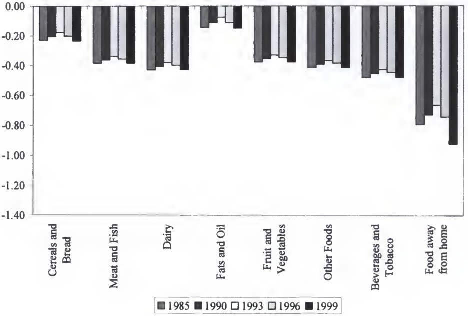

Figure 7.2. Average unconditional Frisch own-price elasticities of demand for food subgroups when data are pooled

CHAPTER 8
SUMMARY AND FURTHER RESEARCH SUGGESTIONS

The objectives of our research were to study the food demand structure and to provide the demand elasticities for major OECD countries. The bias caused by using exchange rates in performing the international comparison analysis suggests that the exchange-rates-converted data be replaced by the PPP-converted data. In our study, the cross-country PPP-converted data from the Eurostat-OECD PPP Programme were used. Data included per capita nominal expenditures and per capita real expenditures of five reference years (1985, 1990, 1993, 1996, and 1999). Nine broad consumption categories and eight food consumption subcategories were formed and the expenditure allocation followed the two-stage budgeting framework. In our study, we fitted two extended versions of Working's model to the data. The analyses were performed for each round of data individually and for pooled data, providing estimations of parameters and corresponding demand elasticities.

The first version of Working's model is the Florida PI model. The strong separability assumption of the Florida PI model makes it suitable for the analysis of the nine broad consumption categories in the first stage of the two-stage budgeting framework. The estimated demand elasticities from the first stage are based on total income and group price. The second version of Working's model (Florida Slutsky model) assumes weak separability. As such, the Florida Slutsky model is more appropriate for the analysis of the second stage of the two-stage budgeting framework. In the second stage, we expand the allocation of the food, beverages, and tobacco category into eight food subcategories. Because demand elasticities in the second stage are based on group expenditure (or food expenditure in our case), the estimated demand elasticities from the second stage are in their conditional values. Some modifications are required to convert the conditional demand elasticities into the unconditional values. Both models estimated parameters using the maximum likelihood estimation procedure. The parameter estimates along with the estimated conditional and unconditional demand elasticities were discussed. Our study differs from the work by Theil et al. (1989) as follows. First, our analyses were performed on both the aggregated consumption categories and the disaggregated food groups, giving the ability to determine the structure of food demand in details. Second, both food consumed at home and food consumed away from home were included in the food, beverages, and tobacco consumption category.

The analysis of the average budget shares indicates that OECD consumers spend most of their total income on demand for food, beverages, and tobacco, followed by gross rent, fuel, and power, and transport and communications. However, OECD consumers spend the least of their total income on demand for medical care. By comparing the percentage share over time, the percentage share of food consumption has decreased during 1985-1993, while the percentage share of the demand for gross rent, fuel, and power has increased since 1985. Within the demand for food, beverages, and tobacco, our analysis shows that OECD consumers spend most of their food expenditure on demand for food away from home. The least allocation of food expenditure is demand for fats and oil. Consumers have decreased their percentage share of food budget on demand for meat and fish but have increased their percentage share on cereals and bread, beverages and tobacco, and food away from home. The percentage share of demands for dairy, fruit and vegetables, and other foods have been stable over time. Overall, the results suggest that consumers are now shifting toward the consumption of cereals and bread, beverages and tobacco, and food away from home.

The results from each individual year for the allocation to broad consumption categories (the first stage of the two-stage budgeting framework) show that the food, beverages, and tobacco category is the most necessary group in all cases, while medical care is the most luxurious group. Consumers in the lower income group allocate a larger proportion of their total expenditure on necessities, such as the food, beverages, and tobacco category and the clothing and footwear category. In contrast, consumers in the higher income group allocate a larger proportion of their total expenditure to the consumption of gross rent, fuel, and power; medical care; transport and communications; recreation; education; and other expenditures. In addition, consumers with a lower income level are more sensitive to price and income changes. By pooling the cross-country and time-series data, pooled estimates for the allocation of total expenditure among broad consumption categories fall within parameter estimates obtained by fitting the Florida PI model to each round of data individually. Estimated income elasticities (obtained from the pooled data) show that food, beverages, and tobacco; clothing and footwear; and gross rent, fuel, and power are necessities. The rest of the broad consumption categories are luxuries. The food, beverages, and tobacco category is the most income and own-price inelastic group.

For the allocation of the food expenditure to food subgroups (the second stage of the two-stage budgeting framework), the results from each individual year show that food away from home is the only conditionally income elastic food item in every round. This means that a 1% increase in food expenditure will increase demand for food away from home by more than 1%. On average, consumers in the lower income level are more sensitive to income and price changes than are consumers in the higher income level. Moreover, the responsiveness of consumers towards changes in income and price are greatest for demand for food away from home. By dividing countries into a higher income group and a lower income group, the results suggest that, given food expenditure, consumers in the lower income group spend more on demand for meat and fish, fats and oil, and fruit and vegetables than do consumers in the higher income group in all cases. In most cases, consumers in the lower income group spend more on demand for cereals and bread and for dairy, while consumers in the higher income group spend more on the demand for beverages and tobacco and for food away from home.

By pooling the cross-country and time-series data, most of the pooled estimates for the allocation of total food expenditure among food subgroups fall within parameter estimates obtained by fitting the Florida Slutsky model to each round of data individually. Estimated conditional income elasticities obtained from the pooled data show that beverages and tobacco and food away from home are conditionally income elastic food items. The rest of the food subgroups are conditionally income inelastic. Fats and oil is the most conditionally income inelastic food item, followed by cereals and bread. Dairy is the least conditionally income inelastic food item. Unconditional income elasticities can be obtained by using parameters estimated from the Florida PI model to convert the conditional income elasticities to their unconditional values. Our results show that, except for food away from home, the unconditional income elasticities of demand for food subgroups are less than one. Food away from home is a necessity food item for higher income countries and a luxury food item for lower income countries. Similarly, unconditional Frisch own-price elasticities suggest that demand for food away from home becomes own-price elastic as we move from higher income to lower income countries.

Although the OECD data used in our study are considered to be of high quality, the study is not without some limitations. First, data covered in our study are mainly from the developed parts of the world. With this in mind, although the study has provided evidence on consumption patterns up to the most present time, general conclusions on global food consumption patterns cannot be made. However, the availability of global data with a comparable quality level in the future would make it possible for an in-depth analysis of a global food consumption pattern over time.

Second, the complexity of the GK approach requires the use of special software to update the data once the outlier is removed. Past studies used the ICP Toolpak developed by the World Bank when working with the ICP data. Due to the absence of software designed specifically for the OECD data, the data updating process was not pursued in our study. Third, it is possible for the predicted budget shares calculated from our models to fall outside the [0,1] range. In addition, there exist some assumption violations through the presence of inferior goods in the first stage of the two-stage budgeting process. These assumption violation problems are resolved when data are pooled.

In conclusion, our analyses provide useful information on demand elasticities of the OECD data for the years 1985, 1990, 1993, 1996, and 1999, respectively. Additional information gained by pooling the data yields better and precise estimates that will best reflect changing consumption patterns. Similar studies with global consumption data will provide a broader spectrum for global consumption patterns. In addition, demand elasticities obtained from our study can be further used as inputs in the simulation models to determine policy impact under different scenarios.

APPENDIX A
DISPERSION OF RELATIVE PRICES

The use of relative prices in the demand systems has become common in the context of cross-country study. Theil and Fiebig (1986) defined the logarithmic of the relative prices of good *i* in country *c* (z_{ic}) as

$$z_{ic} = \log p_{ic} - \sum_{k=1}^{n} \overline{w}_k \log p_{kc}, \tag{A.1}$$

where p_{ic} is the price of good *i* in country *c*, $\overline{w}_k$ is the arithmetic mean of the budget shares $w_{k1},\ldots,w_{kN}$ of good *k* in the *N* countries. The smallest distance of the logarithmic of the relative prices of good *i* across countries is preferable in the cross-country study. In this case, we define the variance of the logarithmic of the relative prices of good *i* across countries as

$$\frac{1}{N}\sum_{c=1}^{N}(z_{ic} - \overline{z}_i)^2 \text{, where} \tag{A.2}$$

$$\overline{z}_i = \log \overline{p}_i - \sum_{k=1}^{n} \overline{w}_k \log \overline{p}_k \text{, and} \tag{A.3}$$

$$\log \overline{p}_i = \frac{1}{N}\sum_{c=1}^{N} \log p_{ic} \,. \tag{A.4}$$

In other words, the difference between z_{ic} and $\overline{z}_i$ can be written as

$$z_{ic} - \overline{z}_i = \log \frac{p_{ic}}{\overline{p}_i} - \sum_{k=1}^{n} \overline{w}_k \log \frac{p_{kc}}{\overline{p}_k} \,. \tag{A.5}$$

The equality between z_{ic} and $\bar{z}_i$ yields the smallest variance of the logarithmic of the relative prices of good *i* across countries. This implies that the relative prices that correspond to the geometric mean prices ($\bar{p}_i$ for $i = 1, \ldots, n$) give the smallest dispersion of relative prices. As a result, the price components in the extended Working's model are deflated by the geometric mean prices.

APPENDIX B
RESULTS OF INCOME AND OWN-PRICE ELASTICITIES FOR INDIVIDUAL YEAR: THE BROAD CONSUMPTION GROUPS

Tables B.1 to B.5 show income elasticities of the demand for broad consumption groups at the geometric mean prices for the years 1985, 1990, 1993, 1996, and 1999, respectively. Countries were sorted by the percentage shares of their real income per capita with respect to that of the United States. For the analysis of broad consumption groups, income elasticities were based on total income and group price. As a result, the estimated income elasticities in this stage show a percentage change of the demand for category *i* (a total of nine consumption categories), given a one percentage change in total income.

For 1985, three broad consumption categories (food, beverages, and tobacco; clothing and footwear; and house furnishings and operations) are necessities, with income elasticities less than one. On average, the food, beverages, and tobacco category has the smallest income elasticities. Except for the United States, income elasticities of the demand for food, beverages, and tobacco range from 0.17 for Canada to 0.54 for Portugal (the lowest income country). However, it is interesting to note that the food, beverages, and tobacco category becomes an inferior good, with income elasticities below zero in the most affluent country (the United States). As noted before, this finding is in contrast to the theory that no inferior goods exist in the Florida PI model because of the preference independence assumption. The next most necessary category is the clothing and footwear category, with income elasticities ranging from 0.72 for the United States to

0.79 for Portugal. House furnishings and operations is the least necessity category, with income elasticities ranging from 0.94 for the United States to 0.95 for Portugal. Six other categories are luxuries, with income elasticities greater than one. Medical care is the most luxurious category because income elasticities for medical care take the largest value. In fact, income elasticities for medical care range from 1.72 for the United States (the highest income country) to 5.64 for Portugal (the lowest income country). In particular, Greece, Ireland, and Portugal have considerably high values in income elasticities of the demand for medical care. For instance, the income elasticity of demand for medical care in Portugal is almost 3.3 times that of the most affluent country (the United States). The next most luxurious category is other expenditures, followed by gross rent, fuel, and power; recreation; and education. Transport and communications is the least luxurious category, with income elasticities ranging from 1.13 for the United States to 1.15 for Portugal.

For 1990, the food, beverages, and tobacco and the clothing and footwear categories are necessities, with income elasticities less than one. The food, beverages, and tobacco category is the most necessary category, with income elasticities ranging from 0.06 for the United States (the highest income country) to 0.49 for Greece (the lowest income country). Income elasticities of the demand for food, beverages, and tobacco vary greatly from the most affluent country to the least affluent country. In fact, income elasticity of demand for food, beverages, and tobacco for Greece (the lowest income country) is about eight times greater than that of the United States (the highest income country). Clothing and footwear is the next most necessary category, with income elasticities ranging from 0.83 for the United States to 0.85 for Greece. The rest of the consumption categories are luxuries, with income elasticities greater than one. Medical care is the most luxurious category, with income elasticities ranging from 1.92 for the United States to 5.62 in Greece. The next most luxurious category is other expenditures, followed by gross rent, fuel, and power; education; recreation; and transport and communications. House furnishings and operations is the least luxurious category, with income elasticities close to unity.

For 1993, three broad consumption categories (food, beverages, and tobacco; clothing and footwear; and gross rent, fuel, and power) are necessities, with income elasticities less than one. Food, beverages, and tobacco is the most necessary category, with the smallest income elasticities. Except for Luxembourg and the United States, income elasticities of the demand for food, beverages, and tobacco range from 0.15 for Switzerland to 0.41 for Ireland (the lowest income country). The food, beverages, and tobacco category becomes an inferior good, with negative income elasticities for the two highest income countries (Luxembourg and the United States). The next most necessary category is clothing and footwear, with income elasticities ranging from 0.89 for Luxembourg (the highest income country) to 0.90 for Ireland. Although gross rent, fuel, and power is the least necessity category, its income elasticities are close to unity. Medical care, on the other hand, is the most luxurious group, with the largest income elasticities (ranging from 1.96 in Luxembourg to 4.58 in Ireland). The next most luxurious category is other expenditures, followed by house furnishings and operations, and recreation. The least luxurious categories are transport and communications, and education. Although both the transport and communications and the education categories are luxuries, both categories have income elasticities close to unity.

For 1996, three broad consumption categories (food, beverages, and tobacco; clothing and footwear; and education) are necessities, with income elasticities less than one. Of all nine broad consumption groups, the food, beverages, and tobacco category is the most necessary category, with income elasticities ranging between 0.46 for the United States and 0.69 for the Russian Federation. Education has the second smallest income elasticity, with values ranging from 0.50 for the United States to 0.71 for the Russian Federation. Clothing and footwear is the least necessity category, with income elasticities ranging from 0.78 for the United States to 0.83 for the Russian Federation. Except for the gross rent, fuel, and power category, the rest of the consumption categories are luxuries, with income elasticities greater than one. The most luxurious group is medical care, with income elasticities ranging from 1.66 for the United States to 9.99 for the Russian Federation. The next most luxurious category is recreation, followed by other expenditures, and house furnishings and operations. Transport and communications is the least luxurious category, with income elasticities ranging from 1.15 for the United States to 1.20 for the Russian Federation. Gross rent, fuel, and power has unitary income elasticities for all countries.

For 1999, three broad consumption categories (food, beverages, and tobacco; clothing and footwear; and gross rent, fuel, and power) are necessities, with income elasticities less than one. The food, beverages, and tobacco category is the most necessary category, with the smallest income elasticities. The values range from 0.45 for Luxembourg (the highest income country) to 0.74 for Ukraine (the lowest income country). The next most necessary category is the gross rent, fuel, and power category, with income elasticities ranging from 0.78 for Luxembourg to 0.85 for Ukraine. Clothing and footwear is the least necessity category, with income elasticities for all countries at approximately 0.96. The rest of the consumption categories are luxuries, with income elasticities greater than one. Medical care and education are the most luxurious categories. Income elasticities of the demand for medical care range from 1.33 for Luxembourg to 2.04 for Ukraine. Similarly, income elasticities of the demand for education range from 1.33 to Luxembourg and 2.05 for Ukraine. The next most luxurious categories are other expenditures, recreation, and house furnishings and operations. Transport and communications is the least luxurious category, with income elasticities ranging from 1.11 for Luxembourg to 1.15 for Ukraine.

Overall, income elasticities become larger as we move from the highest income country to the lowest income country. An inverse relationship between income elasticities and the corresponding income levels suggests that consumers in the lower income level are more sensitive to income changes than are consumers in the higher income level, especially for demand for food, beverages, and tobacco, and demand for medical care. In addition, evidence shows that the income responsiveness of the demand for clothing and footwear; gross rent, fuel, and power; and transport and communications does not vary greatly across countries.

Tables B.6 to B.10 show own-price elasticities of the demand for broad consumption groups for the years 1985, 1990, 1993, 1996, and 1999, respectively. Countries were sorted by the percentage shares of their real income per capita with respect to that of the United States. For 1985, the estimated own-price elasticities of the demand for food, beverages, and tobacco category for the United States are not negative. The resulting non-negative own-price elasticity of the demand for food, beverages, and tobacco for the United States is due to its negative income elasticity (inferior good). The rest of the own-price elasticities have negative signs. The absolute values of the own-price elasticities increase when we move from the United States (the highest income country) to Portugal (the lowest income country). The Slutsky own-price elasticities have the lowest absolute values. In all cases, the absolute values of the Frisch and Cournot own-price elasticities are greater than that of the Slutsky own-price elasticities. Medical care has both Frisch and Cournot own-price elasticities greater than one in absolute values. The Frisch own-price elasticities of demand for medical care vary greatly from -1.08 for the United States to -3.54 for Portugal. The Cournot own-price elasticities of demand for medical care vary from -1.07 for the United States to -3.35 for Portugal. Except for the United States, the absolute values of the Slutsky own-price elasticities of demand for medical care are greater than one. As a result, we can imply that medical care is the most own-price elastic consumption category in most cases. The other expenditures category is also own-price elastic as we move to countries with lower income levels. For instance, the Slutsky own-price elasticities of demand for other expenditures are also greater than one in absolute values for the three lowest income countries (Greece, Ireland, and Portugal). Likewise, except for the United States, Canada, Luxembourg, France, and Germany, the absolute values of the Frisch and Cournot own-price elasticities of the demand for other expenditures are equal to or greater than one. Specifically, Italy, Australia, Japan, and Belgium have unitary Frisch and Cournot own-price elasticities of the demand for other expenditures. The rest of the consumption categories are own-price inelastic, with the absolute values of the own-price elasticities less than one. The food, beverages, and tobacco category has the smallest absolute values of the own-price elasticities. Except for the United States, the Frisch own-price elasticities for food, beverages, and tobacco range from -0.11 for Canada to -0.34 for Portugal. Similarly, the Slutsky own-price elasticities of demand for food, beverages, and tobacco range from -0.11 for Canada to -0.26 for Portugal, whereas the Cournot own-price elasticities for the same category range from -0.15 for Canada to -0.48 for Portugal. Overall, the food, beverages, and tobacco category is the most own-price inelastic group.

For 1990, all of the estimated own-price elasticities for broad consumption categories have negative signs. The absolute values of the own-price elasticities increase when we move from the United States (the highest income country) to Greece (the lowest income country). The Slutsky own-price elasticities have the lowest absolute values. Except for medical care and other expenditures, the absolute values of the own-price elasticities for the rest of the consumption categories are less than one. The food, beverages, and tobacco category has the smallest absolute values of the own-price elasticities, indicating that the food group is the most own-price inelastic group. The Slutsky own-price elasticities of demand for food, beverages, and tobacco range from -0.04 for the United States to -0.24 for Greece. The Frisch own-price elasticities for food, beverages, and tobacco range from -0.04 for the United States to -0.29 for Greece, while the Cournot own-price elasticities for the same category range from -0.05 for the United States to -0.42 for Greece. In contrast, medical care has both Frisch and Cournot own-price elasticities greater than one in absolute values. The Frisch own-price elasticities of demand for medical care vary greatly from -1.15 for the United States to -3.38 for Greece. The Cournot own-price elasticities of demand for medical care vary from -1.12 for the United States to -3.13 for Greece. Except for the United States and Luxembourg, the absolute values of the Slutsky own-price elasticities of demand for medical care are greater than one. The Slutsky own-price elasticities of demand for medical care is unitary for Luxembourg, with values ranging from -0.94 for the United States to -3.02 for Greece. In addition to medical care, the other expenditures category is own-price elastic for some of the lower income countries. For instance, the Slutsky own-price elasticities of demand for other expenditures for Portugal, Ireland, and Greece are -1.01, -1.03, and -1.04, respectively. Similarly, the absolute values of the Frisch and Cournot own-price elasticities of demand for other expenditures are greater than one for Spain, Portugal, Ireland, and Greece, while Norway has a unitary Frisch and Cournot own-price elasticity.

For 1993, the estimated own-price elasticities of the demand for food, beverages, and tobacco category for Luxembourg and the United States are positive. The rest of the own-price elasticities are negative. The absolute values of the own-price elasticities increase when we move from Luxembourg (the highest income country) to Ireland (the lowest income country). The absolute values of both the Frisch and Cournot own-price elasticities are greater than that of the Slutsky own-price elasticities. Medical care is the only consumption category with absolute values of the own-price elasticities greater than one for most of the countries. In fact, medical care becomes own-price elastic category as we move to the lower income countries. The Frisch own-price elasticities of demand for medical care range from -0.99 for Luxembourg to -2.32 for Ireland. The Cournot own-price elasticities of demand for medical care range from -1.00 for Luxembourg to -2.13 for Ireland. The absolute values of the Slutsky own-price elasticities of demand for medical care are less than one for Luxembourg, the United States, Switzerland, Belgium, and Japan. The rest of the consumption categories are own-price inelastic (i.e., own-price elasticities are less than one in absolute values). The food, beverages, and tobacco category has the smallest absolute values of the own-price elasticities. Except for Luxembourg and the United States, whose own-price elasticities are positive (due to their negative income elasticities), the Frisch own-price elasticities for food, beverages, and tobacco range from -0.08 for Switzerland to -0.21 for Ireland. The Slutsky own-price elasticities for food, beverages, and tobacco range from -0.07 for Switzerland to -0.18 for Ireland. The Cournot own-price elasticities for the same category range from -0.10 for Switzerland to -0.31 for Ireland.

For 1996, the absolute values of the own-price elasticities increase when we move from the United States (the highest income country) to the Russian Federation (the lowest income country). The Slutsky own-price elasticities have the lowest absolute values. Medical care has both Frisch and Cournot own-price elasticities greater than one in absolute values for all countries. The Frisch own-price elasticities of demand for medical care vary greatly from -1.16 for the United States to -6.97 for the Russian Federation. The Cournot own-price elasticities of demand for medical care vary from -1.13 for the United States to -6.54 for the Russian Federation. Except for the United States and Luxembourg, the absolute values of the Slutsky own-price elasticities of demand for medical care are greater than one, with values ranging from -1.07 for Switzerland to -6.46 for the Russian Federation. The results suggest that medical care is highly own-price elastic in the lower income countries. In addition to medical care, recreation is another consumption category whose absolute values of the own-price elasticities are greater than one. However, the absolute values of the own-price elasticities of demand for recreation are greater than one for some countries with lower levels of income. For instance, the absolute values of the Frisch and Cournot own-price elasticities of demand for recreation are greater than one for Hungary, Mexico, the Slovak Republic, Poland, and the Russian Federation. Nevertheless, the absolute values of the Slutsky own-price elasticities of demand for recreation are all less than one. The rest of the consumption categories are own-price inelastic, with absolute values of the own-price elasticities less than one in all cases. The food, beverages, and tobacco category has the smallest absolute values of the own-price elasticities. The Frisch own-price elasticities of demand for food, beverages, and tobacco range from -0.32 for the United States to -0.48 for the Russian Federation. Similarly, the Slutsky own-price elasticities of demand for food, beverages, and tobacco range from -0.29 for the United States to -0.37 for the Russian Federation, whereas the Cournot own-price elasticities of demand for the same category range from -0.38 for the United States to -0.61 for the Russian Federation.

For 1999, the absolute values of the own-price elasticities increase when we move from Luxembourg (the highest income country) to Ukraine (the lowest income country), except for the Slutsky own-price elasticities of demand for food, beverages, and tobacco. Four consumption categories with absolute values of own-price elasticities less than one are the food, beverages, and tobacco; the clothing and footwear; the gross rent, fuel, and power; and the transport and communications. Although absolute values of the Slutsky own-price elasticities of demand for food, beverages, and tobacco increase as we move from Luxembourg (the highest income country) to Romania, the value decreases as we move from Romania to Ukraine (the lowest income country). In fact, the Slutsky own-price elasticities of demand for food, beverages, and tobacco range from -0.31 for Luxembourg to -0.39 for Romania and -0.38 for Ukraine. Absolute values of the Frisch and Cournot own-price elasticities of demand for food, beverages, and tobacco increase consistently as we move towards countries with lower income levels. The Frisch own-price elasticities of demand for food, beverages, and tobacco range from -0.34 for Luxembourg to -0.55 for Ukraine. The Cournot own-price elasticities of demand for food, beverages, and tobacco range from -0.40 for Luxembourg to -0.69 for Ukraine. On the other hand, the house furnishings and operations category has absolute values of own-price elasticities greater than one for some lower income countries. Medical care, recreation, education, and other expenditures categories have both Frisch and Cournot own-price elasticities greater than one in absolute values in most cases. Luxembourg and the United States have unitary Frisch and Cournot own-price elasticities of demand for medical care. On average, medical care and education are the most own-price elastic consumption categories. For instance, the Frisch own-price elasticities of demand for medical care range from -1.00 for Luxembourg to -1.52 for Ukraine. The Slutsky own-price elasticities of demand for medical care range from -0.92 for Luxembourg to -1.47 for Ukraine. The Cournot own-price elasticities of demand for medical care range from -1.00 for Luxembourg to -1.50 for Ukraine. For education, both Frisch and Cournot own-price elasticities of demand for education for Luxembourg and the United States are also unitary. The Frisch own-price elasticities of demand for education range from -1.00 for Luxembourg and -1.53 for Ukraine. The Slutsky own-price elasticities of demand for education range from -0.87 for Luxembourg to -1.43 for Ukraine. The Cournot own-price elasticities of demand for education range from -1.00 for Luxembourg to -1.50 for Ukraine.

In summary, absolute values of the own-price elasticities for consumers in the lower income countries are larger than those in the higher income countries, indicating that consumers in the lower income level are more sensitive to price changes. Absolute values of the Slutsky own-price elasticities are the smallest values. Absolute values of the Frisch own-price elasticities are largest for consumption categories with elastic Frisch own-price elasticities. The Cournot own-price elasticities have the largest absolute values for consumption categories with inelastic Frisch own-price elasticities. The demand for some categories changes from being own-price inelastic for higher income countries to being own-price elastic for lower income countries.

Table B.1. Income elasticities for broad consumption groups, 1985

Country	Real income per capita	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United States	1.00	-0.01	0.72	1.26	0.94	1.72	1.13	1.23	1.22	1.47
Canada	0.80	0.17	0.74	1.28	0.94	1.86	1.13	1.24	1.24	1.53
Luxembourg	0.71	0.25	0.74	1.29	0.94	1.96	1.13	1.24	1.24	1.56
France	0.67	0.28	0.75	1.29	0.94	2.01	1.13	1.25	1.25	1.58
Germany	0.67	0.28	0.75	1.29	0.94	2.02	1.13	1.25	1.25	1.58
Italy	0.65	0.30	0.75	1.29	0.94	2.06	1.13	1.25	1.25	1.59
Australia	0.65	0.30	0.75	1.29	0.94	2.06	1.13	1.25	1.25	1.60
Japan	0.64	0.30	0.75	1.29	0.94	2.06	1.13	1.25	1.25	1.60
Belgium	0.64	0.31	0.75	1.29	0.94	2.07	1.14	1.25	1.25	1.60
Netherlands	0.62	0.32	0.75	1.30	0.94	2.10	1.14	1.25	1.25	1.61
Denmark	0.60	0.33	0.75	1.30	0.94	2.14	1.14	1.25	1.25	1.62
United Kingdom	0.59	0.34	0.76	1.30	0.94	2.18	1.14	1.26	1.26	1.63
New Zealand	0.57	0.36	0.76	1.31	0.94	2.22	1.14	1.26	1.26	1.64
Sweden	0.57	0.36	0.76	1.31	0.94	2.23	1.14	1.26	1.26	1.65
Norway	0.56	0.36	0.76	1.31	0.94	2.24	1.14	1.26	1.26	1.65
Austria	0.56	0.36	0.76	1.31	0.94	2.24	1.14	1.26	1.26	1.65
Finland	0.51	0.40	0.76	1.32	0.94	2.42	1.14	1.27	1.26	1.69
Spain	0.50	0.41	0.77	1.32	0.94	2.46	1.14	1.27	1.27	1.71
Greece	0.38	0.49	0.78	1.35	0.95	3.37	1.15	1.29	1.29	1.86
Ireland	0.34	0.52	0.79	1.36	0.95	4.43	1.15	1.30	1.30	1.97
Portugal	0.31	0.54	0.79	1.37	0.95	5.64	1.15	1.31	1.30	2.05
Average		0.33	0.76	1.31	0.94	2.45	1.14	1.26	1.26	1.66

Note: Countries were sorted by real income per capita.

Table B.2. Income elasticities for broad consumption groups, 1990

Country	Real income per capita	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United States	1.00	0.06	0.83	1.24	1.01	1.92	1.11	1.12	1.14	1.48
Luxembourg	0.90	0.15	0.83	1.25	1.01	2.01	1.11	1.12	1.14	1.51
Switzerland	0.86	0.18	0.83	1.25	1.01	2.06	1.11	1.13	1.14	1.52
Italy	0.79	0.23	0.83	1.25	1.01	2.16	1.11	1.13	1.14	1.55
Germany	0.79	0.24	0.83	1.25	1.01	2.17	1.11	1.13	1.14	1.55
France	0.79	0.24	0.83	1.26	1.01	2.17	1.11	1.13	1.14	1.55
Canada	0.75	0.26	0.84	1.26	1.01	2.23	1.11	1.13	1.14	1.56
Belgium	0.75	0.27	0.84	1.26	1.01	2.25	1.11	1.13	1.14	1.56
Japan	0.73	0.28	0.84	1.26	1.01	2.29	1.11	1.13	1.14	1.57
Austria	0.71	0.29	0.84	1.26	1.01	2.32	1.11	1.13	1.14	1.58
Iceland	0.71	0.29	0.84	1.26	1.01	2.33	1.11	1.13	1.14	1.58
United Kingdom	0.71	0.29	0.84	1.26	1.01	2.34	1.11	1.13	1.14	1.58
Denmark	0.70	0.30	0.84	1.26	1.01	2.36	1.11	1.13	1.14	1.59
Netherlands	0.69	0.31	0.84	1.26	1.01	2.39	1.11	1.13	1.14	1.59
Australia	0.68	0.31	0.84	1.27	1.01	2.42	1.11	1.13	1.14	1.60
Sweden	0.65	0.33	0.84	1.27	1.01	2.50	1.11	1.13	1.15	1.61
New Zealand	0.61	0.36	0.84	1.27	1.01	2.65	1.11	1.13	1.15	1.63
Finland	0.60	0.37	0.84	1.27	1.01	2.73	1.11	1.13	1.15	1.64
Norway	0.58	0.38	0.84	1.28	1.01	2.82	1.11	1.13	1.15	1.66
Spain	0.55	0.40	0.84	1.28	1.01	3.05	1.12	1.13	1.15	1.68
Portugal	0.45	0.46	0.85	1.30	1.01	4.37	1.12	1.14	1.15	1.79
Ireland	0.43	0.48	0.85	1.30	1.01	5.20	1.12	1.14	1.16	1.83
Greece	0.42	0.49	0.85	1.30	1.01	5.62	1.12	1.14	1.16	1.84
Average		0.30	0.84	1.27	1.01	2.71	1.11	1.13	1.15	1.61

Note: Countries were sorted by real income per capita.

Table B.3. Income elasticities for broad consumption groups, 1993

Country	Real income per capita	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1.04	-0.06	0.89	0.98	1.17	1.96	1.02	1.09	1.01	1.54
United States	1.00	-0.01	0.89	0.98	1.17	2.00	1.02	1.09	1.01	1.55
Switzerland	0.83	0.15	0.89	0.98	1.18	2.24	1.02	1.09	1.01	1.62
Belgium	0.75	0.22	0.89	0.98	1.18	2.42	1.02	1.10	1.01	1.66
Japan	0.74	0.22	0.89	0.98	1.18	2.42	1.02	1.10	1.01	1.66
Germany	0.72	0.24	0.89	0.98	1.18	2.49	1.02	1.10	1.01	1.68
Canada	0.72	0.24	0.89	0.98	1.18	2.49	1.02	1.10	1.01	1.68
France	0.72	0.24	0.89	0.98	1.18	2.51	1.02	1.10	1.01	1.68
Italy	0.70	0.26	0.89	0.98	1.18	2.58	1.02	1.10	1.01	1.69
Netherlands	0.69	0.26	0.89	0.98	1.18	2.59	1.02	1.10	1.01	1.70
Austria	0.69	0.26	0.89	0.98	1.18	2.60	1.02	1.10	1.01	1.70
Australia	0.67	0.28	0.89	0.98	1.18	2.67	1.02	1.10	1.01	1.71
Iceland	0.65	0.30	0.89	0.98	1.18	2.78	1.02	1.10	1.01	1.73
Denmark	0.63	0.31	0.89	0.98	1.18	2.86	1.02	1.10	1.01	1.74
United Kingdom	0.63	0.31	0.89	0.98	1.18	2.86	1.02	1.10	1.01	1.74
Norway	0.61	0.33	0.89	0.98	1.19	3.02	1.02	1.10	1.01	1.77
New Zealand	0.58	0.34	0.89	0.98	1.19	3.18	1.02	1.10	1.01	1.79
Sweden	0.55	0.37	0.89	0.98	1.19	3.49	1.02	1.10	1.01	1.83
Spain	0.52	0.39	0.90	0.98	1.19	3.92	1.02	1.10	1.01	1.87
Portugal	0.52	0.39	0.90	0.98	1.19	3.99	1.02	1.10	1.01	1.87
Finland	0.51	0.40	0.90	0.98	1.19	4.02	1.02	1.10	1.01	1.88
Greece	0.50	0.41	0.90	0.98	1.19	4.37	1.02	1.10	1.01	1.90
Ireland	0.49	0.41	0.90	0.98	1.19	4.58	1.02	1.10	1.01	1.92
Average		0.27	0.89	0.98	1.18	2.96	1.02	1.10	1.01	1.73

Note: Countries were sorted by real income per capita.

Table B.4. Income elasticities for broad consumption groups, 1996

Country	Real income per capita	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
United States	1.00	0.46	0.78	1.00	1.21	1.66	1.15	1.30	0.50	1.22
Luxembourg	0.99	0.46	0.78	1.00	1.21	1.67	1.15	1.30	0.50	1.22
Switzerland	0.77	0.53	0.80	1.00	1.22	1.80	1.16	1.32	0.56	1.23
Japan	0.74	0.54	0.80	1.00	1.22	1.83	1.16	1.33	0.56	1.24
Belgium	0.73	0.54	0.80	1.00	1.22	1.84	1.16	1.33	0.57	1.24
Germany	0.71	0.55	0.80	1.00	1.22	1.86	1.16	1.33	0.57	1.24
Canada	0.69	0.55	0.80	1.00	1.22	1.87	1.16	1.34	0.58	1.24
Australia	0.69	0.55	0.80	1.00	1.23	1.88	1.16	1.34	0.58	1.24
Iceland	0.68	0.55	0.80	1.00	1.23	1.89	1.16	1.34	0.58	1.24
Netherlands	0.67	0.56	0.80	1.00	1.23	1.90	1.16	1.34	0.58	1.24
Austria	0.66	0.56	0.80	1.00	1.23	1.91	1.16	1.34	0.59	1.24
Italy	0.66	0.56	0.80	1.00	1.23	1.91	1.16	1.34	0.59	1.24
Denmark	0.66	0.56	0.80	1.00	1.23	1.92	1.16	1.34	0.59	1.24
France	0.65	0.56	0.80	1.00	1.23	1.93	1.17	1.34	0.59	1.24
United Kingdom	0.61	0.57	0.80	1.00	1.23	1.98	1.17	1.35	0.60	1.25
Norway	0.60	0.58	0.81	1.00	1.23	2.00	1.17	1.35	0.60	1.25
New Zealand	0.59	0.58	0.81	1.00	1.23	2.02	1.17	1.36	0.60	1.25
Spain	0.54	0.60	0.81	1.00	1.24	2.12	1.17	1.37	0.62	1.25

Note: Countries were sorted by real income per capita.

Table B.4. Continued

Country	Real income per capita	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Israel	0.53	0.60	0.81	1.00	1.24	2.13	1.17	1.37	0.62	1.25
Sweden	0.53	0.60	0.81	1.00	1.24	2.14	1.17	1.37	0.62	1.25
Ireland	0.51	0.60	0.81	1.00	1.24	2.20	1.17	1.37	0.63	1.26
Finland	0.50	0.61	0.81	1.00	1.24	2.21	1.17	1.38	0.63	1.26
Portugal	0.50	0.61	0.81	1.00	1.24	2.22	1.17	1.38	0.63	1.26
Greece	0.49	0.61	0.81	1.00	1.24	2.24	1.17	1.38	0.63	1.26
Slovenia	0.42	0.63	0.82	1.00	1.25	2.54	1.18	1.40	0.65	1.27
Czech Republic	0.39	0.64	0.82	1.00	1.26	2.78	1.18	1.42	0.66	1.28
Hungary	0.30	0.67	0.83	1.00	1.28	4.13	1.19	1.46	0.69	1.30
Mexico	0.30	0.67	0.83	1.00	1.28	4.40	1.19	1.47	0.69	1.30
Slovak Republic	0.27	0.68	0.83	1.00	1.28	5.75	1.19	1.49	0.70	1.31
Poland	0.26	0.69	0.83	1.00	1.29	7.04	1.19	1.50	0.70	1.31
Russian Federation	0.25	0.69	0.83	1.00	1.29	9.99	1.20	1.51	0.71	1.32
Average		0.59	0.81	1.00	1.24	2.70	1.17	1.37	0.61	1.26

Note: Countries were sorted by real income per capita.

Table B.5. Income elasticities for broad consumption groups, 1999

Country	Real income per capita	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Luxembourg	1.07	0.45	0.96	0.78	1.23	1.33	1.11	1.28	1.33	1.32
United States	1.00	0.47	0.96	0.78	1.23	1.34	1.11	1.28	1.34	1.33
Switzerland	0.78	0.53	0.96	0.79	1.25	1.37	1.12	1.30	1.37	1.35
Cyprus	0.75	0.54	0.96	0.79	1.25	1.38	1.12	1.31	1.38	1.36
Austria	0.71	0.55	0.96	0.80	1.25	1.39	1.12	1.31	1.39	1.37
Iceland	0.70	0.56	0.96	0.80	1.25	1.39	1.12	1.31	1.39	1.37
Italy	0.70	0.56	0.96	0.80	1.25	1.39	1.12	1.32	1.39	1.37
Canada	0.65	0.57	0.96	0.80	1.26	1.40	1.12	1.32	1.40	1.38
Denmark	0.64	0.57	0.96	0.80	1.26	1.40	1.12	1.32	1.40	1.38
Germany	0.64	0.57	0.96	0.80	1.26	1.40	1.12	1.32	1.40	1.38
Australia	0.63	0.58	0.96	0.80	1.26	1.40	1.12	1.32	1.41	1.38
United Kingdom	0.63	0.58	0.96	0.80	1.26	1.40	1.12	1.33	1.41	1.38
Norway	0.63	0.58	0.96	0.80	1.26	1.41	1.12	1.33	1.41	1.38
France	0.61	0.58	0.96	0.80	1.26	1.41	1.12	1.33	1.41	1.39
Belgium	0.61	0.58	0.96	0.80	1.26	1.41	1.12	1.33	1.41	1.39
Netherlands	0.60	0.59	0.96	0.80	1.26	1.41	1.12	1.33	1.41	1.39
Japan	0.57	0.59	0.96	0.81	1.27	1.42	1.12	1.34	1.42	1.40
Spain	0.56	0.60	0.96	0.81	1.27	1.43	1.12	1.34	1.43	1.40
Ireland	0.55	0.60	0.96	0.81	1.27	1.43	1.12	1.34	1.43	1.40
New Zealand	0.55	0.60	0.96	0.81	1.27	1.43	1.12	1.34	1.43	1.41
Sweden	0.53	0.60	0.96	0.81	1.27	1.43	1.12	1.34	1.44	1.41
Greece	0.53	0.61	0.96	0.81	1.27	1.44	1.12	1.35	1.44	1.41
Portugal	0.52	0.61	0.96	0.81	1.27	1.44	1.12	1.35	1.44	1.41

Note: Countries were sorted by real income per capita.

Table B.5. Continued

Country	Real income per capita	Food, beverages, and tobacco	Clothing and footwear	Gross rent, fuel, and power	House furnishings and operations	Medical care	Transport and communications	Recreation	Education	Other expenditures
Finland	0.49	0.62	0.96	0.81	1.28	1.45	1.12	1.35	1.45	1.42
Israel	0.47	0.62	0.96	0.81	1.28	1.46	1.12	1.36	1.46	1.43
Slovenia	0.42	0.64	0.96	0.82	1.29	1.48	1.13	1.37	1.49	1.45
Korea	0.40	0.65	0.96	0.82	1.30	1.50	1.13	1.38	1.50	1.47
Czech Republic	0.39	0.65	0.96	0.82	1.30	1.50	1.13	1.39	1.51	1.47
Estonia	0.31	0.67	0.96	0.83	1.32	1.57	1.13	1.42	1.57	1.53
Hungary	0.31	0.67	0.96	0.83	1.32	1.57	1.13	1.42	1.57	1.53
Slovak Republic	0.31	0.68	0.96	0.83	1.32	1.57	1.13	1.42	1.57	1.53
Lithuania	0.28	0.68	0.96	0.83	1.33	1.60	1.13	1.44	1.60	1.55
Mexico	0.28	0.68	0.96	0.83	1.33	1.60	1.13	1.44	1.60	1.55
Poland	0.28	0.69	0.96	0.83	1.33	1.60	1.13	1.44	1.61	1.56
Bulgaria	0.27	0.69	0.96	0.83	1.33	1.62	1.13	1.45	1.62	1.57
Croatia	0.25	0.70	0.96	0.83	1.34	1.65	1.13	1.46	1.65	1.59
Latvia	0.24	0.70	0.96	0.83	1.35	1.67	1.13	1.48	1.67	1.61
Turkey	0.23	0.70	0.96	0.84	1.35	1.69	1.14	1.49	1.70	1.63
Macedonia	0.22	0.71	0.96	0.84	1.36	1.70	1.14	1.49	1.70	1.64
Russian Federation	0.17	0.73	0.96	0.84	1.39	1.85	1.14	1.56	1.85	1.76
Romania	0.17	0.73	0.96	0.84	1.39	1.85	1.14	1.56	1.86	1.76
Ukraine	0.14	0.74	0.96	0.85	1.43	2.04	1.15	1.64	2.05	1.91
Average		0.62	0.96	0.81	1.29	1.51	1.12	1.38	1.51	1.47

Note: Countries were sorted by real income per capita.

Table B.6. Own-price elasticities for broad consumption groups, 1985

Country	Real income per capita	Food, beverages, and tobacco			Clothing and footwear			Gross rent, fuel, and power		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	0.00	0.00	0.00	-0.45	-0.43	-0.47	-0.79	-0.59	-0.84
Canada	0.80	-0.11	-0.11	-0.15	-0.46	-0.44	-0.49	-0.80	-0.61	-0.85
Luxembourg	0.71	-0.16	-0.15	-0.21	-0.47	-0.44	-0.49	-0.81	-0.62	-0.85
France	0.67	-0.18	-0.16	-0.24	-0.47	-0.45	-0.50	-0.81	-0.62	-0.85
Germany	0.67	-0.18	-0.17	-0.24	-0.47	-0.45	-0.50	-0.81	-0.62	-0.85
Italy	0.65	-0.19	-0.17	-0.25	-0.47	-0.45	-0.50	-0.81	-0.63	-0.86
Australia	0.65	-0.19	-0.17	-0.26	-0.47	-0.45	-0.50	-0.81	-0.63	-0.86
Japan	0.64	-0.19	-0.18	-0.26	-0.47	-0.45	-0.50	-0.81	-0.63	-0.86
Belgium	0.64	-0.19	-0.18	-0.26	-0.47	-0.45	-0.50	-0.81	-0.63	-0.86
Netherlands	0.62	-0.20	-0.18	-0.27	-0.47	-0.45	-0.50	-0.81	-0.63	-0.86
Denmark	0.60	-0.21	-0.19	-0.28	-0.47	-0.45	-0.50	-0.82	-0.63	-0.86
United Kingdom	0.59	-0.22	-0.19	-0.29	-0.47	-0.45	-0.50	-0.82	-0.63	-0.86
New Zealand	0.57	-0.23	-0.20	-0.31	-0.48	-0.45	-0.50	-0.82	-0.64	-0.86
Sweden	0.57	-0.23	-0.20	-0.31	-0.48	-0.45	-0.50	-0.82	-0.64	-0.86
Norway	0.56	-0.23	-0.20	-0.31	-0.48	-0.45	-0.50	-0.82	-0.64	-0.86
Austria	0.56	-0.23	-0.20	-0.31	-0.48	-0.45	-0.50	-0.82	-0.64	-0.86
Finland	0.51	-0.25	-0.22	-0.35	-0.48	-0.45	-0.51	-0.83	-0.65	-0.86
Spain	0.50	-0.26	-0.22	-0.35	-0.48	-0.45	-0.51	-0.83	-0.65	-0.86
Greece	0.38	-0.31	-0.25	-0.43	-0.49	-0.46	-0.52	-0.85	-0.67	-0.88
Ireland	0.34	-0.33	-0.26	-0.46	-0.49	-0.46	-0.52	-0.86	-0.69	-0.88
Portugal	0.31	-0.34	-0.26	-0.48	-0.50	-0.46	-0.53	-0.86	-0.70	-0.89
Average		-0.21	-0.18	-0.29	-0.47	-0.45	-0.50	-0.82	-0.64	-0.86

Note: Countries were sorted by real income per capita.

Table B.6. Continued

Country	Real income per capita	House furnishings and operations			Medical care			Transport and communications		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.59	-0.55	-0.62	-1.08	-0.93	-1.07	-0.71	-0.59	-0.76
Canada	0.80	-0.59	-0.55	-0.62	-1.17	-1.01	-1.15	-0.71	-0.59	-0.76
Luxembourg	0.71	-0.59	-0.55	-0.62	-1.23	-1.08	-1.20	-0.71	-0.60	-0.76
France	0.67	-0.59	-0.55	-0.62	-1.26	-1.11	-1.23	-0.71	-0.60	-0.76
Germany	0.67	-0.59	-0.55	-0.62	-1.27	-1.12	-1.24	-0.71	-0.60	-0.76
Italy	0.65	-0.59	-0.55	-0.62	-1.29	-1.14	-1.26	-0.71	-0.60	-0.76
Australia	0.65	-0.59	-0.55	-0.62	-1.29	-1.14	-1.26	-0.71	-0.60	-0.76
Japan	0.64	-0.59	-0.55	-0.62	-1.30	-1.14	-1.26	-0.71	-0.60	-0.76
Belgium	0.64	-0.59	-0.55	-0.62	-1.30	-1.15	-1.26	-0.71	-0.60	-0.76
Netherlands	0.62	-0.59	-0.55	-0.62	-1.32	-1.17	-1.28	-0.71	-0.60	-0.76
Denmark	0.60	-0.59	-0.55	-0.62	-1.34	-1.19	-1.30	-0.71	-0.60	-0.76
United Kingdom	0.59	-0.59	-0.55	-0.62	-1.37	-1.21	-1.33	-0.71	-0.60	-0.76
New Zealand	0.57	-0.59	-0.55	-0.62	-1.40	-1.24	-1.35	-0.71	-0.60	-0.76
Sweden	0.57	-0.59	-0.55	-0.62	-1.40	-1.25	-1.36	-0.71	-0.60	-0.76
Norway	0.56	-0.59	-0.55	-0.62	-1.41	-1.25	-1.36	-0.71	-0.60	-0.76
Austria	0.56	-0.59	-0.55	-0.62	-1.41	-1.25	-1.36	-0.71	-0.60	-0.76
Finland	0.51	-0.59	-0.55	-0.62	-1.52	-1.36	-1.47	-0.72	-0.60	-0.76
Spain	0.50	-0.59	-0.55	-0.62	-1.55	-1.39	-1.49	-0.72	-0.60	-0.76
Greece	0.38	-0.59	-0.55	-0.62	-2.12	-1.94	-2.02	-0.72	-0.61	-0.76
Ireland	0.34	-0.59	-0.55	-0.62	-2.78	-2.56	-2.64	-0.72	-0.61	-0.76
Portugal	0.31	-0.59	-0.55	-0.62	-3.54	-3.28	-3.35	-0.72	-0.62	-0.76
Average		-0.59	-0.55	-0.62	-1.54	-1.38	-1.49	-0.71	-0.60	-0.76

Note: Countries were sorted by real income per capita.

Table B.6. Continued

Country	Real income per capita	Recreation			Education			Other expenditures		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.77	-0.70	-0.79	-0.77	-0.68	-0.79	-0.92	-0.81	-0.93
Canada	0.80	-0.78	-0.71	-0.80	-0.78	-0.69	-0.80	-0.96	-0.84	-0.96
Luxembourg	0.71	-0.78	-0.72	-0.80	-0.78	-0.70	-0.80	-0.98	-0.87	-0.98
France	0.67	-0.78	-0.72	-0.80	-0.78	-0.70	-0.81	-0.99	-0.88	-0.99
Germany	0.67	-0.78	-0.72	-0.80	-0.78	-0.70	-0.81	-0.99	-0.88	-0.99
Italy	0.65	-0.78	-0.72	-0.80	-0.78	-0.70	-0.81	-1.00	-0.89	-1.00
Australia	0.65	-0.78	-0.72	-0.80	-0.78	-0.70	-0.81	-1.00	-0.89	-1.00
Japan	0.64	-0.79	-0.72	-0.80	-0.78	-0.70	-0.81	-1.00	-0.89	-1.00
Belgium	0.64	-0.79	-0.72	-0.80	-0.78	-0.70	-0.81	-1.00	-0.89	-1.00
Netherlands	0.62	-0.79	-0.72	-0.80	-0.79	-0.71	-0.81	-1.01	-0.90	-1.01
Denmark	0.60	-0.79	-0.72	-0.80	-0.79	-0.71	-0.81	-1.02	-0.91	-1.02
United Kingdom	0.59	-0.79	-0.72	-0.81	-0.79	-0.71	-0.81	-1.02	-0.92	-1.02
New Zealand	0.57	-0.79	-0.73	-0.81	-0.79	-0.71	-0.81	-1.03	-0.92	-1.03
Sweden	0.57	-0.79	-0.73	-0.81	-0.79	-0.71	-0.81	-1.03	-0.93	-1.03
Norway	0.56	-0.79	-0.73	-0.81	-0.79	-0.71	-0.81	-1.04	-0.93	-1.03
Austria	0.56	-0.79	-0.73	-0.81	-0.79	-0.71	-0.81	-1.04	-0.93	-1.03
Finland	0.51	-0.80	-0.73	-0.81	-0.79	-0.72	-0.81	-1.06	-0.96	-1.06
Spain	0.50	-0.80	-0.73	-0.81	-0.79	-0.72	-0.81	-1.07	-0.96	-1.06
Greece	0.38	-0.81	-0.75	-0.82	-0.81	-0.73	-0.83	-1.17	-1.07	-1.16
Ireland	0.34	-0.82	-0.76	-0.83	-0.81	-0.74	-0.83	-1.24	-1.14	-1.22
Portugal	0.31	-0.82	-0.76	-0.83	-0.82	-0.75	-0.83	-1.29	-1.19	-1.27
Average		-0.79	-0.73	-0.81	-0.79	-0.71	-0.81	-1.04	-0.93	-1.04

Note: Countries were sorted by real income per capita.

Table B.7. Own-price elasticities for broad consumption groups, 1990

Country	Real income per capita	Food, beverages, and tobacco			Clothing and footwear			Gross rent, fuel, and power		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.04	-0.04	-0.05	-0.50	-0.47	-0.52	-0.75	-0.57	-0.81
Luxembourg	0.90	-0.09	-0.08	-0.12	-0.50	-0.47	-0.53	-0.75	-0.57	-0.81
Switzerland	0.86	-0.11	-0.10	-0.15	-0.50	-0.47	-0.53	-0.75	-0.58	-0.81
Italy	0.79	-0.14	-0.13	-0.19	-0.50	-0.47	-0.53	-0.75	-0.58	-0.81
Germany	0.79	-0.14	-0.13	-0.19	-0.50	-0.47	-0.53	-0.75	-0.58	-0.81
France	0.79	-0.14	-0.13	-0.19	-0.50	-0.47	-0.53	-0.75	-0.58	-0.81
Canada	0.75	-0.16	-0.15	-0.21	-0.50	-0.47	-0.53	-0.76	-0.58	-0.81
Belgium	0.75	-0.16	-0.15	-0.22	-0.50	-0.47	-0.53	-0.76	-0.58	-0.81
Japan	0.73	-0.17	-0.15	-0.23	-0.50	-0.47	-0.53	-0.76	-0.59	-0.81
Austria	0.71	-0.17	-0.16	-0.24	-0.50	-0.48	-0.53	-0.76	-0.59	-0.81
Iceland	0.71	-0.17	-0.16	-0.24	-0.50	-0.48	-0.53	-0.76	-0.59	-0.81
United Kingdom	0.71	-0.18	-0.16	-0.24	-0.50	-0.48	-0.53	-0.76	-0.59	-0.81
Denmark	0.70	-0.18	-0.17	-0.25	-0.50	-0.48	-0.53	-0.76	-0.59	-0.81
Netherlands	0.69	-0.18	-0.17	-0.25	-0.50	-0.48	-0.53	-0.76	-0.59	-0.81
Australia	0.68	-0.19	-0.17	-0.26	-0.50	-0.48	-0.53	-0.76	-0.59	-0.81
Sweden	0.65	-0.20	-0.18	-0.27	-0.51	-0.48	-0.53	-0.76	-0.59	-0.82
New Zealand	0.61	-0.21	-0.19	-0.30	-0.51	-0.48	-0.53	-0.77	-0.60	-0.82
Finland	0.60	-0.22	-0.20	-0.31	-0.51	-0.48	-0.54	-0.77	-0.60	-0.82
Norway	0.58	-0.23	-0.20	-0.32	-0.51	-0.48	-0.54	-0.77	-0.60	-0.82
Spain	0.55	-0.24	-0.21	-0.34	-0.51	-0.48	-0.54	-0.77	-0.61	-0.82
Portugal	0.45	-0.28	-0.23	-0.40	-0.51	-0.48	-0.54	-0.78	-0.62	-0.83
Ireland	0.43	-0.29	-0.24	-0.41	-0.51	-0.48	-0.54	-0.78	-0.63	-0.83
Greece	0.42	-0.29	-0.24	-0.42	-0.51	-0.48	-0.54	-0.78	-0.63	-0.83
Average		-0.18	-0.16	-0.25	-0.50	-0.48	-0.53	-0.76	-0.59	-0.81

Note: Countries were sorted by real income per capita.

Table B.7. Continued

Country	Real income per capita	House furnishings and operations			Medical care			Transport and communications		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.61	-0.56	-0.64	-1.15	-0.94	-1.12	-0.67	-0.55	-0.72
Luxembourg	0.90	-0.61	-0.56	-0.64	-1.21	-1.00	-1.17	-0.67	-0.56	-0.72
Switzerland	0.86	-0.61	-0.56	-0.64	-1.24	-1.03	-1.20	-0.67	-0.56	-0.72
Italy	0.79	-0.61	-0.56	-0.64	-1.30	-1.09	-1.25	-0.67	-0.56	-0.72
Germany	0.79	-0.61	-0.56	-0.64	-1.31	-1.10	-1.26	-0.67	-0.56	-0.72
France	0.79	-0.61	-0.56	-0.64	-1.31	-1.10	-1.26	-0.67	-0.56	-0.72
Canada	0.75	-0.61	-0.56	-0.64	-1.34	-1.13	-1.29	-0.67	-0.56	-0.72
Belgium	0.75	-0.61	-0.56	-0.64	-1.35	-1.14	-1.30	-0.67	-0.56	-0.72
Japan	0.73	-0.61	-0.56	-0.64	-1.37	-1.16	-1.32	-0.67	-0.56	-0.72
Austria	0.71	-0.61	-0.56	-0.64	-1.40	-1.18	-1.34	-0.67	-0.56	-0.72
Iceland	0.71	-0.61	-0.56	-0.64	-1.40	-1.19	-1.34	-0.67	-0.56	-0.72
United Kingdom	0.71	-0.61	-0.56	-0.64	-1.41	-1.20	-1.35	-0.67	-0.56	-0.72
Denmark	0.70	-0.61	-0.56	-0.64	-1.42	-1.21	-1.36	-0.67	-0.56	-0.72
Netherlands	0.69	-0.61	-0.56	-0.64	-1.44	-1.22	-1.37	-0.67	-0.56	-0.72
Australia	0.68	-0.61	-0.56	-0.64	-1.46	-1.24	-1.39	-0.67	-0.56	-0.72
Sweden	0.65	-0.61	-0.56	-0.64	-1.50	-1.29	-1.43	-0.67	-0.56	-0.72
New Zealand	0.61	-0.61	-0.56	-0.64	-1.60	-1.37	-1.51	-0.67	-0.56	-0.72
Finland	0.60	-0.61	-0.56	-0.64	-1.64	-1.41	-1.55	-0.67	-0.56	-0.72
Norway	0.58	-0.61	-0.56	-0.64	-1.70	-1.47	-1.60	-0.67	-0.56	-0.72
Spain	0.55	-0.61	-0.56	-0.64	-1.84	-1.60	-1.73	-0.67	-0.57	-0.72
Portugal	0.45	-0.61	-0.56	-0.64	-2.63	-2.33	-2.45	-0.67	-0.57	-0.72
Ireland	0.43	-0.61	-0.56	-0.64	-3.13	-2.79	-2.90	-0.67	-0.57	-0.72
Greece	0.42	-0.61	-0.56	-0.64	-3.38	-3.02	-3.13	-0.67	-0.57	-0.72
Average		-0.61	-0.56	-0.64	-1.63	-1.40	-1.55	-0.67	-0.56	-0.72

Note: Countries were sorted by real income per capita.

Table B.7. Continued

Country	Real income per capita	Recreation			Education			Other expenditures		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.68	-0.62	-0.70	-0.68	-0.62	-0.72	-0.89	-0.82	-0.90
Luxembourg	0.90	-0.68	-0.62	-0.70	-0.69	-0.62	-0.72	-0.91	-0.84	-0.92
Switzerland	0.86	-0.68	-0.62	-0.70	-0.69	-0.62	-0.72	-0.92	-0.84	-0.92
Italy	0.79	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.93	-0.86	-0.93
Germany	0.79	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.93	-0.86	-0.94
France	0.79	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.93	-0.86	-0.94
Canada	0.75	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.94	-0.87	-0.94
Belgium	0.75	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.94	-0.87	-0.95
Japan	0.73	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.95	-0.88	-0.95
Austria	0.71	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.95	-0.88	-0.95
Iceland	0.71	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.95	-0.88	-0.95
United Kingdom	0.71	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.95	-0.88	-0.96
Denmark	0.70	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.95	-0.88	-0.96
Netherlands	0.69	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.96	-0.89	-0.96
Australia	0.68	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.96	-0.89	-0.96
Sweden	0.65	-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.97	-0.90	-0.97
New Zealand	0.61	-0.68	-0.62	-0.71	-0.69	-0.63	-0.72	-0.98	-0.91	-0.98
Finland	0.60	-0.68	-0.62	-0.71	-0.69	-0.63	-0.72	-0.99	-0.92	-0.99
Norway	0.58	-0.68	-0.62	-0.71	-0.69	-0.63	-0.72	-1.00	-0.93	-1.00
Spain	0.55	-0.68	-0.63	-0.71	-0.69	-0.63	-0.72	-1.01	-0.95	-1.01
Portugal	0.45	-0.68	-0.63	-0.71	-0.69	-0.63	-0.72	-1.08	-1.01	-1.07
Ireland	0.43	-0.68	-0.63	-0.71	-0.69	-0.63	-0.72	-1.10	-1.03	-1.09
Greece	0.42	-0.68	-0.63	-0.71	-0.70	-0.63	-0.72	-1.11	-1.04	-1.10
Average		-0.68	-0.62	-0.71	-0.69	-0.62	-0.72	-0.97	-0.90	-0.97

Note: Countries were sorted by real income per capita.

Table B.8. Own-price elasticities for broad consumption groups, 1993

Country	Real income per capita	Food, beverages, and tobacco			Clothing and footwear			Gross rent, fuel, and power		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
Luxembourg	1.04	0.03	0.03	0.04	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
United States	1.00	0.01	0.01	0.01	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Switzerland	0.83	-0.08	-0.07	-0.10	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Belgium	0.75	-0.11	-0.10	-0.16	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Japan	0.74	-0.11	-0.11	-0.16	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Germany	0.72	-0.12	-0.11	-0.17	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Canada	0.72	-0.12	-0.11	-0.17	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
France	0.72	-0.12	-0.12	-0.17	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Italy	0.70	-0.13	-0.12	-0.19	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Netherlands	0.69	-0.13	-0.12	-0.19	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Austria	0.69	-0.13	-0.13	-0.19	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Australia	0.67	-0.14	-0.13	-0.20	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Iceland	0.65	-0.15	-0.14	-0.22	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Denmark	0.63	-0.16	-0.14	-0.22	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
United Kingdom	0.63	-0.16	-0.14	-0.22	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Norway	0.61	-0.17	-0.15	-0.24	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
New Zealand	0.58	-0.17	-0.16	-0.25	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Sweden	0.55	-0.19	-0.17	-0.27	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Spain	0.52	-0.20	-0.18	-0.29	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Portugal	0.52	-0.20	-0.18	-0.29	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Finland	0.51	-0.20	-0.18	-0.29	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Greece	0.50	-0.21	-0.18	-0.30	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59
Ireland	0.49	-0.21	-0.18	-0.31	-0.45	-0.43	-0.49	-0.50	-0.41	-0.59
Average		-0.14	-0.13	-0.20	-0.45	-0.43	-0.48	-0.50	-0.41	-0.59

Note: Countries were sorted by real income per capita.

Table B.8. Continued

Country	Real income per capita	House furnishings and operations			Medical care			Transport and communications		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
Luxembourg	1.04	-0.59	-0.54	-0.63	-0.99	-0.76	-1.00	-0.52	-0.44	-0.58
United States	1.00	-0.59	-0.54	-0.63	-1.01	-0.78	-1.01	-0.52	-0.44	-0.58
Switzerland	0.83	-0.60	-0.55	-0.63	-1.13	-0.90	-1.10	-0.52	-0.44	-0.58
Belgium	0.75	-0.60	-0.55	-0.63	-1.22	-0.99	-1.18	-0.52	-0.44	-0.58
Japan	0.74	-0.60	-0.55	-0.63	-1.23	-0.99	-1.18	-0.52	-0.44	-0.58
Germany	0.72	-0.60	-0.55	-0.63	-1.26	-1.02	-1.21	-0.52	-0.44	-0.58
Canada	0.72	-0.60	-0.55	-0.63	-1.26	-1.02	-1.21	-0.52	-0.44	-0.58
France	0.72	-0.60	-0.55	-0.63	-1.27	-1.03	-1.22	-0.52	-0.44	-0.58
Italy	0.70	-0.60	-0.55	-0.63	-1.30	-1.06	-1.25	-0.52	-0.44	-0.58
Netherlands	0.69	-0.60	-0.55	-0.63	-1.31	-1.07	-1.25	-0.52	-0.44	-0.58
Austria	0.69	-0.60	-0.55	-0.63	-1.32	-1.07	-1.26	-0.52	-0.44	-0.58
Australia	0.67	-0.60	-0.55	-0.63	-1.35	-1.11	-1.29	-0.52	-0.44	-0.58
Iceland	0.65	-0.60	-0.55	-0.63	-1.41	-1.16	-1.33	-0.52	-0.44	-0.58
Denmark	0.63	-0.60	-0.55	-0.63	-1.45	-1.20	-1.37	-0.52	-0.44	-0.58
United Kingdom	0.63	-0.60	-0.55	-0.63	-1.45	-1.20	-1.37	-0.52	-0.44	-0.58
Norway	0.61	-0.60	-0.55	-0.63	-1.53	-1.27	-1.44	-0.52	-0.44	-0.58
New Zealand	0.58	-0.60	-0.55	-0.63	-1.61	-1.34	-1.51	-0.52	-0.44	-0.58
Sweden	0.55	-0.60	-0.55	-0.63	-1.76	-1.48	-1.64	-0.52	-0.44	-0.58
Spain	0.52	-0.60	-0.56	-0.63	-1.99	-1.68	-1.84	-0.52	-0.44	-0.58
Portugal	0.52	-0.60	-0.56	-0.63	-2.02	-1.71	-1.86	-0.52	-0.44	-0.58
Finland	0.51	-0.60	-0.56	-0.63	-2.04	-1.73	-1.88	-0.52	-0.44	-0.58
Greece	0.50	-0.60	-0.56	-0.63	-2.21	-1.89	-2.04	-0.52	-0.44	-0.58
Ireland	0.49	-0.60	-0.56	-0.63	-2.32	-1.98	-2.13	-0.52	-0.44	-0.58
Average		-0.60	-0.55	-0.63	-1.50	-1.24	-1.42	-0.52	-0.44	-0.58

Note: Countries were sorted by real income per capita.

Table B.8. Continued

Country	Real income per capita	Recreation			Education			Other expenditures		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
Luxembourg	1.04	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.78	-0.66	-0.81
United States	1.00	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.79	-0.67	-0.82
Switzerland	0.83	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.82	-0.70	-0.84
Belgium	0.75	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.84	-0.73	-0.86
Japan	0.74	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.84	-0.73	-0.86
Germany	0.72	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.85	-0.73	-0.87
Canada	0.72	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.85	-0.73	-0.87
France	0.72	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.85	-0.74	-0.87
Italy	0.70	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.86	-0.74	-0.88
Netherlands	0.69	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.86	-0.74	-0.88
Austria	0.69	-0.55	-0.51	-0.59	-0.51	-0.47	-0.55	-0.86	-0.75	-0.88
Australia	0.67	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.87	-0.75	-0.88
Iceland	0.65	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.88	-0.76	-0.89
Denmark	0.63	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.88	-0.77	-0.90
United Kingdom	0.63	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.88	-0.77	-0.90
Norway	0.61	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.89	-0.78	-0.91
New Zealand	0.58	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.91	-0.79	-0.92
Sweden	0.55	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.92	-0.81	-0.93
Spain	0.52	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.95	-0.84	-0.95
Portugal	0.52	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.95	-0.84	-0.95
Finland	0.51	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.95	-0.84	-0.96
Greece	0.50	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.96	-0.85	-0.97
Ireland	0.49	-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.97	-0.86	-0.97
Average		-0.56	-0.51	-0.59	-0.51	-0.47	-0.55	-0.88	-0.76	-0.89

Note: Countries were sorted by real income per capita.

Table B.9. Own-price elasticities for broad consumption groups, 1996

Country	Real income per capita	Food, beverages, and tobacco			Clothing and footwear			Gross rent, fuel, and power		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.32	-0.29	-0.38	-0.55	-0.52	-0.57	-0.70	-0.57	-0.76
Luxembourg	0.99	-0.32	-0.29	-0.39	-0.55	-0.52	-0.57	-0.70	-0.57	-0.76
Switzerland	0.77	-0.37	-0.32	-0.44	-0.55	-0.53	-0.57	-0.70	-0.57	-0.76
Japan	0.74	-0.37	-0.33	-0.45	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Belgium	0.73	-0.38	-0.33	-0.45	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Germany	0.71	-0.38	-0.33	-0.46	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Canada	0.69	-0.38	-0.33	-0.46	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Australia	0.69	-0.38	-0.33	-0.46	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Iceland	0.68	-0.39	-0.34	-0.47	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Netherlands	0.67	-0.39	-0.34	-0.47	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Austria	0.66	-0.39	-0.34	-0.47	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Italy	0.66	-0.39	-0.34	-0.47	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Denmark	0.66	-0.39	-0.34	-0.47	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
France	0.65	-0.39	-0.34	-0.47	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
United Kingdom	0.61	-0.40	-0.34	-0.49	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Norway	0.60	-0.40	-0.34	-0.49	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
New Zealand	0.59	-0.41	-0.35	-0.49	-0.56	-0.53	-0.58	-0.70	-0.57	-0.76
Spain	0.54	-0.42	-0.35	-0.51	-0.56	-0.54	-0.59	-0.70	-0.57	-0.76
Israel	0.53	-0.42	-0.35	-0.51	-0.56	-0.54	-0.59	-0.70	-0.57	-0.76
Sweden	0.53	-0.42	-0.35	-0.51	-0.56	-0.54	-0.59	-0.70	-0.57	-0.76
Ireland	0.51	-0.42	-0.35	-0.52	-0.57	-0.54	-0.59	-0.70	-0.57	-0.76
Finland	0.50	-0.42	-0.35	-0.52	-0.57	-0.54	-0.59	-0.70	-0.57	-0.76
Portugal	0.50	-0.42	-0.35	-0.52	-0.57	-0.54	-0.59	-0.70	-0.57	-0.76
Greece	0.49	-0.43	-0.36	-0.52	-0.57	-0.54	-0.59	-0.70	-0.57	-0.76
Slovenia	0.42	-0.44	-0.36	-0.54	-0.57	-0.54	-0.59	-0.70	-0.57	-0.76
Czech Republic	0.39	-0.45	-0.36	-0.55	-0.57	-0.54	-0.60	-0.70	-0.57	-0.76
Hungary	0.30	-0.47	-0.37	-0.58	-0.58	-0.55	-0.60	-0.70	-0.57	-0.76
Mexico	0.30	-0.47	-0.37	-0.59	-0.58	-0.55	-0.60	-0.70	-0.57	-0.76
Slovak Republic	0.27	-0.48	-0.37	-0.60	-0.58	-0.55	-0.60	-0.70	-0.57	-0.76
Poland	0.26	-0.48	-0.37	-0.60	-0.58	-0.55	-0.60	-0.70	-0.57	-0.76
Russian Federation	0.25	-0.48	-0.37	-0.61	-0.58	-0.55	-0.61	-0.70	-0.57	-0.76
Average		-0.41	-0.34	-0.50	-0.56	-0.54	-0.59	-0.70	-0.57	-0.76

Note: Countries were sorted by real income per capita.

Table B.9. Continued

Country	Real income per capita	House furnishings and operations			Medical care			Transport and communications		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.84	-0.77	-0.86	-1.16	-0.97	-1.13	-0.81	-0.67	-0.84
Luxembourg	0.99	-0.84	-0.77	-0.86	-1.16	-0.97	-1.14	-0.81	-0.67	-0.84
Switzerland	0.77	-0.85	-0.78	-0.86	-1.25	-1.07	-1.22	-0.81	-0.67	-0.84
Japan	0.74	-0.85	-0.78	-0.86	-1.28	-1.09	-1.24	-0.81	-0.68	-0.84
Belgium	0.73	-0.85	-0.78	-0.87	-1.28	-1.10	-1.24	-0.81	-0.68	-0.84
Germany	0.71	-0.85	-0.78	-0.87	-1.30	-1.11	-1.25	-0.81	-0.68	-0.84
Canada	0.69	-0.85	-0.78	-0.87	-1.31	-1.12	-1.26	-0.81	-0.68	-0.84
Australia	0.69	-0.85	-0.78	-0.87	-1.31	-1.13	-1.27	-0.81	-0.68	-0.84
Iceland	0.68	-0.86	-0.79	-0.87	-1.32	-1.14	-1.27	-0.81	-0.68	-0.84
Netherlands	0.67	-0.86	-0.79	-0.87	-1.32	-1.14	-1.28	-0.81	-0.68	-0.84
Austria	0.66	-0.86	-0.79	-0.87	-1.34	-1.15	-1.29	-0.81	-0.68	-0.84
Italy	0.66	-0.86	-0.79	-0.87	-1.34	-1.15	-1.29	-0.81	-0.68	-0.84
Denmark	0.66	-0.86	-0.79	-0.87	-1.34	-1.15	-1.29	-0.81	-0.68	-0.84
France	0.65	-0.86	-0.79	-0.87	-1.34	-1.16	-1.30	-0.81	-0.68	-0.84
United Kingdom	0.61	-0.86	-0.79	-0.87	-1.38	-1.20	-1.33	-0.81	-0.68	-0.84
Norway	0.60	-0.86	-0.79	-0.87	-1.40	-1.21	-1.34	-0.81	-0.68	-0.84
New Zealand	0.59	-0.86	-0.79	-0.87	-1.41	-1.23	-1.36	-0.81	-0.68	-0.84
Spain	0.54	-0.86	-0.80	-0.87	-1.48	-1.30	-1.42	-0.82	-0.69	-0.85
Israel	0.53	-0.86	-0.80	-0.88	-1.49	-1.30	-1.43	-0.82	-0.69	-0.85
Sweden	0.53	-0.86	-0.80	-0.88	-1.49	-1.31	-1.43	-0.82	-0.69	-0.85
Ireland	0.51	-0.87	-0.80	-0.88	-1.53	-1.35	-1.47	-0.82	-0.69	-0.85
Finland	0.50	-0.87	-0.80	-0.88	-1.54	-1.36	-1.48	-0.82	-0.69	-0.85
Portugal	0.50	-0.87	-0.80	-0.88	-1.55	-1.36	-1.48	-0.82	-0.69	-0.85
Greece	0.49	-0.87	-0.80	-0.88	-1.56	-1.38	-1.50	-0.82	-0.69	-0.85
Slovenia	0.42	-0.87	-0.81	-0.88	-1.78	-1.58	-1.69	-0.82	-0.70	-0.85
Czech Republic	0.39	-0.88	-0.81	-0.89	-1.94	-1.74	-1.84	-0.82	-0.70	-0.85
Hungary	0.30	-0.89	-0.83	-0.90	-2.88	-2.63	-2.72	-0.83	-0.71	-0.85
Mexico	0.30	-0.89	-0.83	-0.90	-3.07	-2.81	-2.89	-0.83	-0.71	-0.85
Slovak Republic	0.27	-0.90	-0.84	-0.90	-4.01	-3.69	-3.77	-0.83	-0.71	-0.86
Poland	0.26	-0.90	-0.84	-0.91	-4.91	-4.54	-4.61	-0.83	-0.71	-0.86
Russian Federation	0.25	-0.90	-0.84	-0.91	-6.97	-6.46	-6.54	-0.83	-0.72	-0.86
Average		-0.87	-0.80	-0.88	-1.88	-1.67	-1.80	-0.82	-0.69	-0.85

Note: Countries were sorted by real income per capita.

Table B.9. Continued

Country	Real income per capita	Recreation			Education			Other expenditures		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
United States	1.00	-0.91	-0.80	-0.92	-0.35	-0.34	-0.37	-0.85	-0.76	-0.87
Luxembourg	0.99	-0.91	-0.80	-0.92	-0.35	-0.34	-0.37	-0.85	-0.76	-0.87
Switzerland	0.77	-0.92	-0.82	-0.93	-0.39	-0.37	-0.41	-0.86	-0.77	-0.87
Japan	0.74	-0.93	-0.83	-0.93	-0.39	-0.38	-0.42	-0.86	-0.77	-0.88
Belgium	0.73	-0.93	-0.83	-0.94	-0.40	-0.38	-0.42	-0.86	-0.78	-0.88
Germany	0.71	-0.93	-0.83	-0.94	-0.40	-0.38	-0.43	-0.86	-0.78	-0.88
Canada	0.69	-0.93	-0.83	-0.94	-0.40	-0.38	-0.43	-0.86	-0.78	-0.88
Australia	0.69	-0.93	-0.84	-0.94	-0.40	-0.38	-0.43	-0.86	-0.78	-0.88
Iceland	0.68	-0.93	-0.84	-0.94	-0.40	-0.39	-0.43	-0.87	-0.78	-0.88
Netherlands	0.67	-0.93	-0.84	-0.94	-0.41	-0.39	-0.43	-0.87	-0.78	-0.88
Austria	0.66	-0.94	-0.84	-0.94	-0.41	-0.39	-0.44	-0.87	-0.78	-0.88
Italy	0.66	-0.94	-0.84	-0.94	-0.41	-0.39	-0.44	-0.87	-0.78	-0.88
Denmark	0.66	-0.94	-0.84	-0.94	-0.41	-0.39	-0.44	-0.87	-0.78	-0.88
France	0.65	-0.94	-0.84	-0.94	-0.41	-0.39	-0.44	-0.87	-0.78	-0.88
United Kingdom	0.61	-0.94	-0.85	-0.95	-0.42	-0.40	-0.45	-0.87	-0.78	-0.88
Norway	0.60	-0.94	-0.85	-0.95	-0.42	-0.40	-0.45	-0.87	-0.79	-0.88
New Zealand	0.59	-0.95	-0.85	-0.95	-0.42	-0.40	-0.45	-0.87	-0.79	-0.88
Spain	0.54	-0.95	-0.86	-0.96	-0.43	-0.41	-0.46	-0.87	-0.79	-0.89
Israel	0.53	-0.95	-0.86	-0.96	-0.43	-0.41	-0.46	-0.88	-0.79	-0.89
Sweden	0.53	-0.95	-0.86	-0.96	-0.43	-0.41	-0.46	-0.88	-0.79	-0.89
Ireland	0.51	-0.96	-0.87	-0.96	-0.44	-0.41	-0.47	-0.88	-0.79	-0.89
Finland	0.50	-0.96	-0.87	-0.96	-0.44	-0.41	-0.47	-0.88	-0.80	-0.89
Portugal	0.50	-0.96	-0.87	-0.96	-0.44	-0.41	-0.47	-0.88	-0.80	-0.89
Greece	0.49	-0.96	-0.87	-0.97	-0.44	-0.41	-0.47	-0.88	-0.80	-0.89
Slovenia	0.42	-0.98	-0.89	-0.98	-0.45	-0.43	-0.49	-0.89	-0.81	-0.90
Czech Republic	0.39	-0.99	-0.90	-0.99	-0.46	-0.43	-0.50	-0.89	-0.81	-0.90
Hungary	0.30	-1.02	-0.94	-1.02	-0.48	-0.44	-0.52	-0.91	-0.83	-0.91
Mexico	0.30	-1.03	-0.94	-1.02	-0.48	-0.44	-0.52	-0.91	-0.83	-0.91
Slovak Republic	0.27	-1.04	-0.96	-1.04	-0.49	-0.45	-0.53	-0.91	-0.84	-0.92
Poland	0.26	-1.05	-0.96	-1.04	-0.49	-0.45	-0.53	-0.92	-0.84	-0.92
Russian Federation	0.25	-1.06	-0.97	-1.05	-0.49	-0.45	-0.53	-0.92	-0.85	-0.93
Average		-0.96	-0.86	-0.96	-0.42	-0.40	-0.46	-0.88	-0.79	-0.89

Note: Countries were sorted by real income per capita.

Table B.10. Own-price elasticities for broad consumption groups, 1999

Country	Real income per capita	Food, beverages, and tobacco			Clothing and footwear		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
Luxembourg	1.07	-0.34	-0.31	-0.40	-0.72	-0.68	-0.73
United States	1.00	-0.35	-0.32	-0.42	-0.72	-0.68	-0.73
Switzerland	0.78	-0.40	-0.35	-0.47	-0.72	-0.68	-0.73
Cyprus	0.75	-0.41	-0.35	-0.48	-0.72	-0.68	-0.73
Austria	0.71	-0.41	-0.36	-0.49	-0.72	-0.68	-0.73
Iceland	0.70	-0.42	-0.36	-0.49	-0.72	-0.68	-0.73
Italy	0.70	-0.42	-0.36	-0.50	-0.72	-0.68	-0.73
Canada	0.65	-0.43	-0.37	-0.51	-0.72	-0.68	-0.73
Denmark	0.64	-0.43	-0.37	-0.51	-0.72	-0.68	-0.73
Germany	0.64	-0.43	-0.37	-0.51	-0.72	-0.68	-0.73
Australia	0.63	-0.43	-0.37	-0.51	-0.72	-0.68	-0.73
United Kingdom	0.63	-0.43	-0.37	-0.51	-0.72	-0.68	-0.73
Norway	0.63	-0.43	-0.37	-0.51	-0.72	-0.68	-0.73
France	0.61	-0.43	-0.37	-0.52	-0.72	-0.68	-0.73
Belgium	0.61	-0.43	-0.37	-0.52	-0.72	-0.68	-0.73
Netherlands	0.60	-0.44	-0.37	-0.52	-0.72	-0.68	-0.73
Japan	0.57	-0.44	-0.37	-0.53	-0.72	-0.68	-0.73
Spain	0.56	-0.45	-0.38	-0.53	-0.72	-0.68	-0.73
Ireland	0.55	-0.45	-0.38	-0.53	-0.72	-0.68	-0.73
New Zealand	0.55	-0.45	-0.38	-0.54	-0.72	-0.68	-0.73
Sweden	0.53	-0.45	-0.38	-0.54	-0.72	-0.68	-0.73
Greece	0.53	-0.45	-0.38	-0.54	-0.72	-0.68	-0.73
Portugal	0.52	-0.45	-0.38	-0.54	-0.72	-0.68	-0.73
Finland	0.49	-0.46	-0.38	-0.55	-0.72	-0.68	-0.73
Israel	0.47	-0.47	-0.38	-0.56	-0.72	-0.68	-0.73
Slovenia	0.42	-0.48	-0.39	-0.57	-0.72	-0.68	-0.73
Korea	0.40	-0.48	-0.39	-0.58	-0.72	-0.68	-0.73
Czech Republic	0.39	-0.48	-0.39	-0.59	-0.72	-0.68	-0.73
Estonia	0.31	-0.50	-0.39	-0.61	-0.72	-0.68	-0.74
Hungary	0.31	-0.50	-0.39	-0.61	-0.72	-0.68	-0.74
Slovak Republic	0.31	-0.50	-0.39	-0.61	-0.72	-0.68	-0.74
Lithuania	0.28	-0.51	-0.39	-0.62	-0.72	-0.68	-0.74
Mexico	0.28	-0.51	-0.39	-0.62	-0.72	-0.68	-0.74
Poland	0.28	-0.51	-0.39	-0.63	-0.72	-0.68	-0.74
Bulgaria	0.27	-0.51	-0.39	-0.63	-0.72	-0.68	-0.74
Croatia	0.25	-0.52	-0.39	-0.64	-0.72	-0.68	-0.74
Latvia	0.24	-0.52	-0.39	-0.64	-0.72	-0.68	-0.74
Turkey	0.23	-0.53	-0.39	-0.65	-0.72	-0.68	-0.74
Macedonia	0.22	-0.53	-0.39	-0.65	-0.72	-0.68	-0.74
Russian Federation	0.17	-0.54	-0.39	-0.67	-0.72	-0.68	-0.74
Romania	0.17	-0.54	-0.39	-0.67	-0.72	-0.68	-0.74
Ukraine	0.14	-0.55	-0.38	-0.69	-0.72	-0.68	-0.74
Average		-0.46	-0.38	-0.56	-0.72	-0.68	-0.73

Note: Countries were sorted by real income per capita.

Table B.10. Continued

Country	Real income per capita	Gross rent, fuel, and power			House furnishings and operations		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
Luxembourg	1.07	-0.58	-0.51	-0.63	-0.92	-0.83	-0.93
United States	1.00	-0.58	-0.51	-0.64	-0.92	-0.84	-0.93
Switzerland	0.78	-0.59	-0.51	-0.65	-0.93	-0.85	-0.94
Cyprus	0.75	-0.59	-0.51	-0.65	-0.93	-0.85	-0.94
Austria	0.71	-0.60	-0.51	-0.65	-0.94	-0.86	-0.94
Iceland	0.70	-0.60	-0.51	-0.65	-0.94	-0.86	-0.94
Italy	0.70	-0.60	-0.51	-0.65	-0.94	-0.86	-0.94
Canada	0.65	-0.60	-0.51	-0.66	-0.94	-0.86	-0.94
Denmark	0.64	-0.60	-0.51	-0.66	-0.94	-0.86	-0.95
Germany	0.64	-0.60	-0.51	-0.66	-0.94	-0.86	-0.95
Australia	0.63	-0.60	-0.51	-0.66	-0.94	-0.86	-0.95
United Kingdom	0.63	-0.60	-0.51	-0.66	-0.94	-0.86	-0.95
Norway	0.63	-0.60	-0.51	-0.66	-0.94	-0.86	-0.95
France	0.61	-0.60	-0.51	-0.66	-0.94	-0.86	-0.95
Belgium	0.61	-0.60	-0.51	-0.66	-0.94	-0.86	-0.95
Netherlands	0.60	-0.60	-0.51	-0.66	-0.94	-0.87	-0.95
Japan	0.57	-0.60	-0.51	-0.66	-0.95	-0.87	-0.95
Spain	0.56	-0.60	-0.51	-0.66	-0.95	-0.87	-0.95
Ireland	0.55	-0.60	-0.51	-0.66	-0.95	-0.87	-0.95
New Zealand	0.55	-0.60	-0.51	-0.66	-0.95	-0.87	-0.95
Sweden	0.53	-0.60	-0.51	-0.66	-0.95	-0.87	-0.95
Greece	0.53	-0.60	-0.51	-0.66	-0.95	-0.87	-0.95
Portugal	0.52	-0.60	-0.51	-0.66	-0.95	-0.88	-0.96
Finland	0.49	-0.61	-0.51	-0.67	-0.95	-0.88	-0.96
Israel	0.47	-0.61	-0.51	-0.67	-0.96	-0.88	-0.96
Slovenia	0.42	-0.61	-0.51	-0.67	-0.96	-0.89	-0.97
Korea	0.40	-0.61	-0.51	-0.67	-0.97	-0.90	-0.97
Czech Republic	0.39	-0.61	-0.51	-0.67	-0.97	-0.90	-0.97
Estonia	0.31	-0.62	-0.51	-0.68	-0.98	-0.91	-0.99
Hungary	0.31	-0.62	-0.51	-0.68	-0.99	-0.92	-0.99
Slovak Republic	0.31	-0.62	-0.51	-0.68	-0.99	-0.92	-0.99
Lithuania	0.28	-0.62	-0.51	-0.68	-0.99	-0.92	-0.99
Mexico	0.28	-0.62	-0.51	-0.68	-0.99	-0.92	-0.99
Poland	0.28	-0.62	-0.51	-0.69	-0.99	-0.92	-0.99
Bulgaria	0.27	-0.62	-0.51	-0.69	-1.00	-0.93	-1.00
Croatia	0.25	-0.62	-0.51	-0.69	-1.00	-0.93	-1.00
Latvia	0.24	-0.62	-0.51	-0.69	-1.01	-0.94	-1.01
Turkey	0.23	-0.62	-0.51	-0.69	-1.01	-0.95	-1.01
Macedonia	0.22	-0.62	-0.51	-0.69	-1.01	-0.95	-1.01
Russian Federation	0.17	-0.63	-0.51	-0.70	-1.04	-0.98	-1.04
Romania	0.17	-0.63	-0.51	-0.70	-1.04	-0.98	-1.04
Ukraine	0.14	-0.63	-0.51	-0.71	-1.07	-1.00	-1.06
Average		-0.61	-0.51	-0.67	-0.97	-0.89	-0.97

Note: Countries were sorted by real income per capita.

Table B.10. Continued

Country	Real income per capita	Medical care			Transport and communications		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
Luxembourg	1.07	-1.00	-0.92	-1.00	-0.83	-0.68	-0.86
United States	1.00	-1.00	-0.93	-1.00	-0.83	-0.68	-0.86
Switzerland	0.78	-1.03	-0.96	-1.02	-0.83	-0.69	-0.86
Cyprus	0.75	-1.03	-0.96	-1.03	-0.83	-0.69	-0.86
Austria	0.71	-1.04	-0.97	-1.03	-0.84	-0.69	-0.86
Iceland	0.70	-1.04	-0.97	-1.04	-0.84	-0.69	-0.86
Italy	0.70	-1.04	-0.97	-1.04	-0.84	-0.69	-0.86
Canada	0.65	-1.05	-0.98	-1.04	-0.84	-0.69	-0.86
Denmark	0.64	-1.05	-0.98	-1.04	-0.84	-0.69	-0.86
Germany	0.64	-1.05	-0.98	-1.05	-0.84	-0.69	-0.86
Australia	0.63	-1.05	-0.98	-1.05	-0.84	-0.69	-0.86
United Kingdom	0.63	-1.05	-0.98	-1.05	-0.84	-0.69	-0.86
Norway	0.63	-1.05	-0.98	-1.05	-0.84	-0.69	-0.86
France	0.61	-1.05	-0.99	-1.05	-0.84	-0.69	-0.86
Belgium	0.61	-1.05	-0.99	-1.05	-0.84	-0.69	-0.86
Netherlands	0.60	-1.06	-0.99	-1.05	-0.84	-0.70	-0.86
Japan	0.57	-1.06	-1.00	-1.06	-0.84	-0.70	-0.86
Spain	0.56	-1.07	-1.00	-1.06	-0.84	-0.70	-0.86
Ireland	0.55	-1.07	-1.00	-1.06	-0.84	-0.70	-0.87
New Zealand	0.55	-1.07	-1.00	-1.06	-0.84	-0.70	-0.87
Sweden	0.53	-1.07	-1.01	-1.07	-0.84	-0.70	-0.87
Greece	0.53	-1.07	-1.01	-1.07	-0.84	-0.70	-0.87
Portugal	0.52	-1.07	-1.01	-1.07	-0.84	-0.70	-0.87
Finland	0.49	-1.08	-1.02	-1.08	-0.84	-0.70	-0.87
Israel	0.47	-1.09	-1.03	-1.09	-0.84	-0.70	-0.87
Slovenia	0.42	-1.11	-1.05	-1.10	-0.84	-0.70	-0.87
Korea	0.40	-1.12	-1.06	-1.11	-0.84	-0.71	-0.87
Czech Republic	0.39	-1.12	-1.06	-1.12	-0.84	-0.71	-0.87
Estonia	0.31	-1.17	-1.11	-1.16	-0.84	-0.71	-0.87
Hungary	0.31	-1.17	-1.11	-1.16	-0.84	-0.71	-0.87
Slovak Republic	0.31	-1.17	-1.11	-1.17	-0.84	-0.71	-0.87
Lithuania	0.28	-1.20	-1.14	-1.19	-0.85	-0.71	-0.87
Mexico	0.28	-1.20	-1.14	-1.19	-0.85	-0.71	-0.87
Poland	0.28	-1.20	-1.14	-1.19	-0.85	-0.71	-0.87
Bulgaria	0.27	-1.21	-1.15	-1.20	-0.85	-0.72	-0.87
Croatia	0.25	-1.23	-1.17	-1.22	-0.85	-0.72	-0.87
Latvia	0.24	-1.25	-1.19	-1.24	-0.85	-0.72	-0.87
Turkey	0.23	-1.26	-1.21	-1.25	-0.85	-0.72	-0.87
Macedonia	0.22	-1.27	-1.21	-1.26	-0.85	-0.72	-0.87
Russian Federation	0.17	-1.38	-1.32	-1.36	-0.85	-0.73	-0.87
Romania	0.17	-1.38	-1.33	-1.37	-0.85	-0.73	-0.87
Ukraine	0.14	-1.52	-1.47	-1.50	-0.86	-0.73	-0.88
Average		-1.12	-1.06	-1.12	-0.84	-0.70	-0.87

Note: Countries were sorted by real income per capita.

Table B.10. Continued

Country	Real income per capita	Recreation			Education		
		Frisch	Slutsky	Cournot	Frisch	Slutsky	Cournot
Luxembourg	1.07	-0.95	-0.83	-0.96	-1.00	-0.87	-1.00
United States	1.00	-0.96	-0.83	-0.96	-1.00	-0.88	-1.00
Switzerland	0.78	-0.97	-0.86	-0.98	-1.03	-0.91	-1.02
Cyprus	0.75	-0.98	-0.86	-0.98	-1.03	-0.91	-1.03
Austria	0.71	-0.98	-0.86	-0.98	-1.04	-0.92	-1.03
Iceland	0.70	-0.98	-0.87	-0.98	-1.04	-0.92	-1.03
Italy	0.70	-0.98	-0.87	-0.98	-1.04	-0.92	-1.03
Canada	0.65	-0.99	-0.87	-0.99	-1.05	-0.93	-1.04
Denmark	0.64	-0.99	-0.87	-0.99	-1.05	-0.93	-1.04
Germany	0.64	-0.99	-0.87	-0.99	-1.05	-0.93	-1.04
Australia	0.63	-0.99	-0.87	-0.99	-1.05	-0.93	-1.04
United Kingdom	0.63	-0.99	-0.87	-0.99	-1.05	-0.93	-1.05
Norway	0.63	-0.99	-0.88	-0.99	-1.05	-0.93	-1.05
France	0.61	-0.99	-0.88	-0.99	-1.05	-0.94	-1.05
Belgium	0.61	-0.99	-0.88	-0.99	-1.05	-0.94	-1.05
Netherlands	0.60	-0.99	-0.88	-1.00	-1.06	-0.94	-1.05
Japan	0.57	-1.00	-0.89	-1.00	-1.06	-0.95	-1.06
Spain	0.56	-1.00	-0.89	-1.00	-1.07	-0.95	-1.06
Ireland	0.55	-1.00	-0.89	-1.00	-1.07	-0.95	-1.06
New Zealand	0.55	-1.00	-0.89	-1.00	-1.07	-0.96	-1.06
Sweden	0.53	-1.00	-0.89	-1.00	-1.07	-0.96	-1.07
Greece	0.53	-1.01	-0.89	-1.00	-1.07	-0.96	-1.07
Portugal	0.52	-1.01	-0.89	-1.01	-1.08	-0.96	-1.07
Finland	0.49	-1.01	-0.90	-1.01	-1.08	-0.97	-1.08
Israel	0.47	-1.02	-0.91	-1.01	-1.09	-0.98	-1.08
Slovenia	0.42	-1.03	-0.92	-1.02	-1.11	-1.00	-1.10
Korea	0.40	-1.03	-0.93	-1.03	-1.12	-1.01	-1.11
Czech Republic	0.39	-1.04	-0.93	-1.03	-1.13	-1.02	-1.11
Estonia	0.31	-1.06	-0.96	-1.06	-1.17	-1.07	-1.16
Hungary	0.31	-1.06	-0.96	-1.06	-1.17	-1.07	-1.16
Slovak Republic	0.31	-1.06	-0.96	-1.06	-1.18	-1.07	-1.16
Lithuania	0.28	-1.08	-0.98	-1.07	-1.20	-1.10	-1.18
Mexico	0.28	-1.08	-0.98	-1.07	-1.20	-1.10	-1.18
Poland	0.28	-1.08	-0.98	-1.07	-1.20	-1.10	-1.18
Bulgaria	0.27	-1.08	-0.98	-1.08	-1.21	-1.11	-1.19
Croatia	0.25	-1.09	-1.00	-1.09	-1.23	-1.13	-1.21
Latvia	0.24	-1.10	-1.01	-1.09	-1.25	-1.15	-1.23
Turkey	0.23	-1.11	-1.02	-1.10	-1.27	-1.17	-1.25
Macedonia	0.22	-1.11	-1.02	-1.10	-1.27	-1.17	-1.25
Russian Federation	0.17	-1.17	-1.07	-1.15	-1.38	-1.29	-1.36
Romania	0.17	-1.17	-1.08	-1.15	-1.39	-1.29	-1.36
Ukraine	0.14	-1.22	-1.13	-1.21	-1.53	-1.43	-1.50
Average		-1.03	-0.92	-1.03	-1.13	-1.02	-1.12

Note: Countries were sorted by real income per capita.

Table B.10. Continued

Country	Real income per capita	Other expenditures		
		Frisch	Slutsky	Cournot
Luxembourg	1.07	-0.99	-0.86	-0.99
United States	1.00	-0.99	-0.87	-0.99
Switzerland	0.78	-1.01	-0.90	-1.01
Cyprus	0.75	-1.02	-0.90	-1.01
Austria	0.71	-1.02	-0.91	-1.02
Iceland	0.70	-1.02	-0.91	-1.02
Italy	0.70	-1.02	-0.91	-1.02
Canada	0.65	-1.03	-0.92	-1.03
Denmark	0.64	-1.03	-0.92	-1.03
Germany	0.64	-1.03	-0.92	-1.03
Australia	0.63	-1.03	-0.92	-1.03
United Kingdom	0.63	-1.03	-0.92	-1.03
Norway	0.63	-1.03	-0.92	-1.03
France	0.61	-1.04	-0.93	-1.03
Belgium	0.61	-1.04	-0.93	-1.03
Netherlands	0.60	-1.04	-0.93	-1.04
Japan	0.57	-1.05	-0.94	-1.04
Spain	0.56	-1.05	-0.94	-1.04
Ireland	0.55	-1.05	-0.94	-1.04
New Zealand	0.55	-1.05	-0.94	-1.05
Sweden	0.53	-1.05	-0.95	-1.05
Greece	0.53	-1.06	-0.95	-1.05
Portugal	0.52	-1.06	-0.95	-1.05
Finland	0.49	-1.06	-0.96	-1.06
Israel	0.47	-1.07	-0.96	-1.06
Slovenia	0.42	-1.09	-0.98	-1.08
Korea	0.40	-1.10	-0.99	-1.09
Czech Republic	0.39	-1.10	-1.00	-1.09
Estonia	0.31	-1.14	-1.04	-1.13
Hungary	0.31	-1.14	-1.04	-1.13
Slovak Republic	0.31	-1.14	-1.04	-1.13
Lithuania	0.28	-1.16	-1.06	-1.15
Mexico	0.28	-1.16	-1.06	-1.15
Poland	0.28	-1.16	-1.07	-1.15
Bulgaria	0.27	-1.17	-1.08	-1.16
Croatia	0.25	-1.19	-1.09	-1.17
Latvia	0.24	-1.20	-1.11	-1.19
Turkey	0.23	-1.22	-1.13	-1.20
Macedonia	0.22	-1.22	-1.13	-1.21
Russian Federation	0.17	-1.31	-1.22	-1.29
Romania	0.17	-1.32	-1.23	-1.30
Ukraine	0.14	-1.43	-1.34	-1.40
Average		-1.10	-0.99	-1.09

Note: Countries were sorted by real income per capita.

APPENDIX C
RESULTS OF INCOME AND OWN-PRICE ELASTICITIES FOR INDIVIDUAL YEAR: THE FOOD SUBGROUPS

Tables C.1 to C.5 report the conditional income elasticities of demand for food subgroups at the geometric mean prices for the years 1985, 1990, 1993, 1996, and 1999, respectively. Tables C.6 to C.10 report the unconditional income elasticities of demand for food subgroups at the geometric mean prices for the years 1985, 1990, 1993, 1996, and 1999, respectively. Countries were sorted by the percentage shares of their total real income per capita with respect to that of the United States. For the analysis of the food subgroups, income elasticities are based on total food expenditure and item price. As a result, the estimated conditional income elasticities in this stage show a percentage change of demand for a particular food subgroup, given a one percentage change of total food expenditure.

For 1985, given food expenditure, two food subgroups (dairy and food away from home) are conditionally income elastic, with conditionally income elasticities greater than one. The results imply that, given food expenditure, a one percentage increase in food budget will increase spending on dairy and food away from home by a larger proportion. Food away from home is the most conditionally income elastic food item with conditional income elasticities ranging from 1.96 for the United States (the highest income country) to 5.78 for Portugal (the lowest income country). Unlike the conditional income elasticities of demand for food away from home, the conditional income elasticities of demand for dairy do not vary greatly. In fact, the conditional income elasticities of demand for dairy range from 1.17 for the United States to 1.20 for Portugal. The rest of the food subgroups (cereals and bread, meat and fish, fats and oil, fruit and vegetables, other foods, and beverages and tobacco) have conditional income elasticities less than one. Specifically, negative conditional income elasticities of demand for the cereals and bread and the fats and oil subgroups suggest that, given food expenditure, a one percentage increase in the food budget will decrease spending on cereals and bread and on fats and oil.

In the case of the unconditional income elasticities, the results show that most of the unconditional income elasticities are less than one. This confirms that the food group is a necessity in general. However, for some countries with lower income levels (such as Sweden, Norway, Finland, Greece, Ireland, and Portugal), the unconditional income elasticities of demand for food away from home are greater than one (elastic). For instance, a one percentage increase in total income will increase demand for food away from home in Portugal (the lowest income country) by 3.10%. As a result, consumption of food away from home in lower income countries is considered a luxury. Moreover, some of the food subgroups are inferior goods with negative unconditional income elasticities for most of the income levels, such as cereals and bread, fats and oil, and dairy (for the United States). On average, meat and fish is a necessity food item with the lowest positive unconditional income elasticities.

For 1990, given food expenditure, the conditional income elasticities of demand for cereals and bread, meat and fish, dairy, fats and oil, and beverages and tobacco are less than one. For all income levels, a one percentage increase in food expenditure will decrease the demand for fats and oil, especially for three of the highest income countries (the United States, Switzerland, and Italy). Consumers in the United States decrease their demand for fats and oil by 2.02%, given a one percentage increase in total food expenditure. Under a similar situation, consumers in the United States, Switzerland, and Italy decrease their demand for meat and fish by 0.08%, 0.07%, and 0.04%, respectively. Consumers in the rest of the countries increase their demand for meat and fish by less than 1%, given a one percentage increase in total food expenditure. In the cases of the cereals and bread, dairy, and beverages and tobacco subcategories, consumers in all income levels increase their demand by a lesser proportion as total food expenditure increases. Three food subcategories with conditional income elasticities greater than one are fruit and vegetables, other foods, and food away from home. Food away from home is the most conditionally income elastic food item, with conditional income elasticities ranging from 1.98 for the United States to 3.28 for Sweden. The conditional income elasticities of demand for fruit and vegetables and other foods do not vary greatly across countries. The conditional income elasticities of demand for fruit and vegetables are between 1.16 for the United States and 1.18 for Sweden, while the conditional income elasticities of demand for other foods are between 1.09 for the United States and 1.10 for Sweden. The other foods subcategory is the least conditionally income elastic food item.

In terms of the unconditional income elasticities, fats and oil is an inferior food item, with negative unconditional income elasticities for all income levels. The meat and fish subcategory is an inferior good for three of the highest income countries (the United States, Switzerland, and Italy) but is a necessity for all other countries in the sample. The rest of the food subcategories are mostly necessities, with unconditional income elasticities less than one, except for demand for food away from home for some of the lower income countries (such as Sweden, Norway, Portugal, Ireland, and Greece). Essentially, the results imply that food away from home becomes a luxury food item as we move from higher income to lower income countries. The unconditional income elasticities of demand for food away from home vary from 0.13 for the United States to 1.22 for Greece.

For 1993, given food expenditure, the conditional income elasticities of the demand for dairy, fats and oil, and beverages and tobacco are positive and less than one. As a result, given a one percentage increase in total food expenditure, the demand for these three conditionally inelastic food items will increase by less than 1%. Although demands for cereals and bread and other foods have most of their conditional income elasticities less than one, some of the values are negative. This results in a decrease in demand for cereals and bread and other foods as food expenditure increases by 1%. In fact, demand for both food items decreases the most in Luxembourg. For a one percentage increase in food expenditure, demands for cereals and bread and other foods for Luxembourg decrease by 0.24% and 0.36%, respectively. On the other hand, food items with conditional income elasticities greater than one include meat and fish, fruit and vegetables, and food away from home. Food away from home is the most conditionally income elastic subcategory, with conditional income elasticities varying from 1.54 for Luxembourg to 1.86 for Sweden. The next most conditionally income elastic food item is fruit and vegetables, with conditional income elasticities ranging from 1.30 for Luxembourg to 1.38 for Sweden. Meat and fish is the least conditionally income elastic food item. However, unlike demand for food away from home, the conditional income elasticities of demand for meat and fish do not vary greatly across countries.

The results of the unconditional income elasticities show that food items are necessities in most cases. On average, other foods and cereals and bread are the most income inelastic food items with the smallest unconditional income elasticities. Meat and fish, dairy, fats and oil, fruit and vegetables, beverages and tobacco, and food away from home are inferior goods with negative unconditional income elasticities for the two richest countries (Luxembourg and the United States).

For 1996, given food expenditure, the conditional income elasticities of demand for cereals and bread, meat and fish, dairy, fats and oil, fruit and vegetables, and other foods are all less than one. The demand for these six food items increases by less than 1% for a one percentage increase in food expenditure (except for demand for cereals and bread in the United States, Luxembourg, Switzerland, and Spain, whose conditional income elasticities decrease with increasing food expenditure). In contrast, the conditional income elasticities of demand for beverages and tobacco and food away from home are both greater than one, indicating that these two food subgroups are conditionally income elastic food items. Food away from home is the most conditionally income elastic food item, with conditional income elasticities between 1.65 for Luxembourg and 19.13 for the Russian Federation. The results suggest a large variation of conditional income elasticities of demand for food away from home across countries. Specifically, a one percentage increase in food expenditure will increase demand for food away from home for consumers in the Russian Federation by 19.13% compared with a 1.65% increase for consumers in Luxembourg. However, the conditional income elasticities of the demand for beverages and tobacco vary slightly from 1.10 for Luxembourg to 1.11 for the Russian Federation.

The results on the unconditional income elasticities show that food subgroups are necessities, with unconditional income elasticities less than one (except for the demand for food away from home). However, cereals and bread is an inferior good for the United States, Luxembourg, Switzerland, and Spain. On average, cereals and bread is the most income inelastic food item, with the smallest average unconditional income elasticities. Demand for food away from home is a necessity food item for the United States, Luxembourg, Switzerland, and Belgium, with unconditional income elasticities less than one. In contrast, demand for food away from home for the rest of the countries is a luxury food item, with unconditional income elasticities greater than one. The Russian Federation has the largest unconditional income elasticities, suggesting that a one percentage increase in total income will increase demand for food away from home by 13.25%. The unconditional income elasticity of demand for food away from home for the Russian Federation (the lowest income country) is almost 17 times that of the unconditional income elasticity for the United States (the highest income country).

For 1999, given total food expenditure, the conditional income elasticities of demand for beverages and tobacco and food away from home are both greater than one. These results imply that, conditional on the food expenditure, consumers allocate more than 1% on demand for beverages and tobacco and food away from home when their food expenditure increases by 1%. Food away from home is the most conditionally income elastic food subgroup, with conditional income elasticities ranging from 1.48 for Luxembourg to 11.46 for Ukraine. The next most conditionally income elastic food subgroup is beverages and tobacco, with conditional income elasticities varying from 1.31 for Luxembourg to 1.85 for Ukraine. On the other hand, the conditional income elasticities of demand for the rest of the food items (cereals and bread, meat and fish, dairy, and other foods) are all positive and smaller than one, indicating that the demand for these four food subgroups increases by less than 1% for a percentage increase in total food expenditure. However, demand for the fats and oil and the fruit and vegetables subgroups for Luxembourg and Cyprus decrease by less than 1% for a percentage increase in total food expenditure. On average, the fats and oil subgroup is the most conditionally income inelastic.

In the case of the unconditional income elasticities, most of the food subgroups have unconditional income elasticities less than one. However, demand for beverages and tobacco and food away from home become luxury goods when moving from higher income countries to lower income countries. For instance, the unconditional income elasticities of demand for food away from home are between 0.67 for Luxembourg and 8.50 for Ukraine, while the unconditional income elasticities of demand for beverages and tobacco are between 0.60 for Luxembourg and 1.37 for Ukraine. The fats and oil and the fruit and vegetables subgroups are inferior goods for Luxembourg and Cyprus, suggesting a decrease in demand for these goods when total income increases. Other than Luxembourg and Cyprus, the fats and oil and the fruit and vegetables subgroups are necessities. Moreover, the rest of the food subgroups (cereals and bread, meat and fish, dairy, and other foods) are also necessities.

Tables C.11 to C.15 report the unconditional Frisch own-price elasticities of demand for food subgroups for the years 1985, 1990, 1993, 1996, and 1999, respectively.

For 1985, most of the unconditional Frisch own-price elasticities of the demand for six food subgroups (meat and fish, dairy, fruit and vegetables, other foods, beverages and tobacco, and food away from home) are negative with absolute values less than one, except for food away from home for the two lowest income countries (Ireland and Portugal). Because the cereals and bread and the fats and oil subgroups are inferior goods, a one percentage increase in their prices will increase their demand in most cases. Demand for food away from home has changed from an own-price inelastic food item to an own-price elastic food item. In fact, consumers in Ireland and Portugal decrease their demand for food away from home by more than 1% for a percentage increase on the price of food away from home. On average, consumers are more responsive to price changes of demand for food away from home and for dairy.

For 1990, because the fats and oil subgroup is an inferior good, consumers are willing to increase demand for fats and oil as price increases. The unconditional Frisch own-price elasticities for the rest of the food subgroups are negative (except for the demand for meat and fish in the United States, Luxembourg, Switzerland, Italy, and United Kingdom). By excluding demand for fats and oil, a comparison between the average unconditional Frisch own-price elasticities of demand for the rest of the food subgroups shows that consumers are highly sensitive to a price change of demand for food away from home. The unconditional Frisch own-price elasticities of demand for food away from home range from -0.08 for the United States (the highest income country) to -0.73 for Greece (the lowest income country).

For 1993, most of unconditional Frisch own-price elasticities have negative signs. On average, food away from home has the largest average value of the unconditional Frisch own-price elasticities in absolute terms, while other foods and cereals and bread have the lowest values. The average unconditional Frisch own-price elasticity of demand for food away from home is -0.23, indicating that consumers decrease demand for food away from home by just 0.23% for a one percentage price increase.

For 1996, the unconditional Frisch own-price elasticities have negative signs with some exceptions for cereals and bread in three affluent countries (United States, Luxembourg, and Switzerland) and in Spain. On average, food away from home has the largest unconditional Frisch own-price elasticities (in absolute terms), while the cereals and bread subgroup has the lowest absolute values. In addition, food away from home is considered the only own-price elastic food item on average. The average unconditional Frisch own-price elasticity of demand for food away from home is -1.14. Specifically, the consumption of food away from home becomes own-price elastic for countries with a low level of affluence such as Czech Republic, Hungary, Mexico, the Slovak Republic, Poland, and the Russian Federation. The values of the unconditional Frisch own-price elasticities range from -0.55 for the United States to -9.25 for the Russian Federation.

For 1999, all of the unconditional Frisch own-price elasticities have negative signs (except for demand for fats and oil and fruit and vegetables in Luxembourg and Cyprus). Food away from home has the largest average value of unconditional Frisch own-price elasticities (in absolute terms). On average, food away from home is the only own-price elastic food item. The range of the unconditional Frisch own-price elasticities of demand for food away from home is between -0.50 for Luxembourg (the highest income country) and -6.35 for Ukraine (the lowest income country). The rest of the food subgroups are all own-price inelastic on average.

Altogether, the average unconditional Frisch own-price elasticities show that most of the food subgroups are own-price inelastic (except for food away from home in 1996 and 1999). Consumers with lower levels of affluence are more sensitive to price changes than those with higher levels of affluence.

Table C.1. Conditional income elasticities for food subgroups, 1985

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	-1.12	0.07	1.17	-3.61	0.75	0.97	0.81	1.96
Canada	-0.30	0.27	1.18	-0.95	0.77	0.97	0.82	2.34
Luxembourg	-0.53	0.21	1.18	-1.52	0.76	0.97	0.81	2.16
France	-0.53	0.21	1.18	-1.51	0.76	0.97	0.81	2.16
Germany	-0.17	0.31	1.19	-0.68	0.77	0.97	0.82	2.51
Italy	-0.55	0.20	1.18	-1.58	0.76	0.97	0.81	2.15
Australia	-0.42	0.24	1.18	-1.24	0.77	0.97	0.82	2.23
Japan	-0.01	0.37	1.19	-0.36	0.78	0.97	0.83	2.91
Belgium	-0.31	0.27	1.18	-0.98	0.77	0.97	0.82	2.33
Netherlands	-0.12	0.33	1.19	-0.56	0.78	0.97	0.82	2.62
Denmark	-0.12	0.33	1.19	-0.56	0.78	0.97	0.82	2.62
United Kingdom	-0.29	0.28	1.18	-0.93	0.77	0.97	0.82	2.35
New Zealand	-0.11	0.33	1.19	-0.56	0.78	0.97	0.82	2.62
Sweden	0.11	0.42	1.20	-0.15	0.79	0.97	0.83	3.60
Norway	0.06	0.40	1.19	-0.24	0.78	0.97	0.83	3.21
Austria	-0.28	0.28	1.18	-0.89	0.77	0.97	0.82	2.37
Finland	-0.06	0.36	1.19	-0.45	0.78	0.97	0.82	2.76
Spain	-0.39	0.25	1.18	-1.15	0.77	0.97	0.82	2.26
Greece	-0.17	0.32	1.19	-0.66	0.77	0.97	0.82	2.52
Ireland	0.03	0.39	1.19	-0.28	0.78	0.97	0.83	3.09
Portugal	0.23	0.48	1.20	0.05	0.79	0.97	0.83	5.78
Average	-0.24	0.30	1.19	-0.90	0.77	0.97	0.82	2.69

Note: Countries were sorted by real income per capita.

Table C.2. Conditional income elasticities for food subgroups, 1990

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	0.48	-0.08	0.82	-2.02	1.16	1.09	0.39	1.98
Luxembourg	0.51	0.04	0.82	-1.22	1.16	1.09	0.43	2.12
Switzerland	0.48	-0.07	0.82	-1.94	1.16	1.09	0.40	1.99
Italy	0.49	-0.04	0.82	-1.70	1.16	1.09	0.41	2.02
Germany	0.54	0.15	0.83	-0.71	1.17	1.09	0.47	2.31
France	0.53	0.10	0.83	-0.91	1.17	1.09	0.46	2.21
Canada	0.55	0.18	0.83	-0.59	1.17	1.09	0.49	2.39
Belgium	0.53	0.10	0.83	-0.90	1.17	1.09	0.46	2.22
Japan	0.54	0.14	0.83	-0.73	1.17	1.09	0.47	2.30
Austria	0.52	0.08	0.82	-1.01	1.17	1.09	0.45	2.18
Iceland	0.55	0.20	0.83	-0.53	1.17	1.09	0.49	2.45
United Kingdom	0.51	0.02	0.82	-1.31	1.16	1.09	0.43	2.09
Denmark	0.57	0.23	0.83	-0.41	1.17	1.10	0.51	2.56
Netherlands	0.57	0.23	0.83	-0.41	1.17	1.10	0.51	2.57
Australia	0.53	0.13	0.83	-0.81	1.17	1.09	0.46	2.26
Sweden	0.60	0.33	0.84	-0.10	1.18	1.10	0.55	3.28
New Zealand	0.57	0.25	0.83	-0.34	1.17	1.10	0.52	2.67
Finland	0.58	0.27	0.83	-0.30	1.17	1.10	0.52	2.73
Norway	0.59	0.31	0.83	-0.18	1.18	1.10	0.54	3.01
Spain	0.52	0.06	0.82	-1.11	1.16	1.09	0.44	2.15
Portugal	0.55	0.20	0.83	-0.53	1.17	1.09	0.49	2.45
Ireland	0.56	0.21	0.83	-0.48	1.17	1.09	0.50	2.49
Greece	0.56	0.21	0.83	-0.47	1.17	1.09	0.50	2.50
Average	0.54	0.14	0.83	-0.81	1.17	1.09	0.47	2.39

Note: Countries were sorted by real income per capita.

Table C.3. Conditional income elasticities for food subgroups, 1993

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	-0.24	1.04	0.98	0.49	1.30	-0.36	0.73	1.54
United States	-0.09	1.04	0.98	0.52	1.31	-0.18	0.74	1.57
Switzerland	-0.02	1.04	0.98	0.53	1.32	-0.10	0.74	1.60
Belgium	-0.01	1.04	0.98	0.53	1.32	-0.09	0.74	1.60
Japan	0.15	1.04	0.98	0.57	1.34	0.10	0.75	1.67
Germany	0.21	1.04	0.98	0.58	1.35	0.16	0.76	1.71
Canada	0.15	1.04	0.98	0.57	1.34	0.10	0.75	1.68
France	0.13	1.04	0.98	0.56	1.34	0.07	0.75	1.66
Italy	0.07	1.04	0.98	0.55	1.33	0.00	0.75	1.63
Netherlands	0.28	1.04	0.98	0.61	1.37	0.25	0.77	1.79
Austria	0.07	1.04	0.98	0.55	1.33	0.00	0.75	1.63
Australia	0.08	1.04	0.98	0.55	1.33	0.02	0.75	1.64
Iceland	0.17	1.04	0.98	0.58	1.34	0.12	0.76	1.69
United Kingdom	0.11	1.04	0.98	0.56	1.33	0.05	0.75	1.65
Denmark	0.20	1.04	0.98	0.58	1.35	0.15	0.76	1.71
Norway	0.24	1.04	0.98	0.59	1.36	0.19	0.76	1.74
New Zealand	0.21	1.04	0.98	0.58	1.35	0.16	0.76	1.71
Sweden	0.33	1.04	0.98	0.62	1.38	0.30	0.77	1.86
Spain	-0.09	1.04	0.98	0.52	1.31	-0.18	0.74	1.57
Portugal	0.00	1.04	0.98	0.53	1.32	-0.07	0.74	1.60
Finland	0.31	1.04	0.98	0.61	1.37	0.27	0.77	1.83
Greece	-0.11	1.04	0.98	0.51	1.31	-0.21	0.74	1.57
Ireland	0.21	1.04	0.98	0.58	1.35	0.16	0.76	1.71
Average	0.10	1.04	0.98	0.56	1.34	0.04	0.75	1.67

Note: Countries were sorted by real income per capita.

Table C.4. Conditional income elasticities for food subgroups, 1996

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	-0.09	0.63	0.23	0.17	0.74	0.34	1.10	1.71
Luxembourg	-0.24	0.61	0.16	0.09	0.73	0.29	1.10	1.65
Switzerland	-0.02	0.64	0.27	0.22	0.75	0.37	1.10	1.74
Japan	0.24	0.68	0.41	0.38	0.77	0.48	1.10	1.98
Belgium	0.10	0.65	0.33	0.29	0.75	0.41	1.10	1.82
Germany	0.22	0.67	0.40	0.36	0.76	0.47	1.10	1.95
Canada	0.14	0.66	0.35	0.31	0.76	0.43	1.10	1.85
Australia	0.11	0.66	0.34	0.30	0.76	0.42	1.10	1.83
Iceland	0.16	0.66	0.36	0.32	0.76	0.44	1.10	1.87
Netherlands	0.26	0.68	0.42	0.39	0.77	0.49	1.10	2.01
Austria	0.11	0.66	0.34	0.30	0.76	0.42	1.10	1.83
Italy	0.17	0.66	0.37	0.33	0.76	0.44	1.10	1.89
Denmark	0.23	0.68	0.41	0.37	0.77	0.47	1.10	1.97
France	0.16	0.66	0.36	0.32	0.76	0.44	1.10	1.87
United Kingdom	0.21	0.67	0.39	0.36	0.76	0.46	1.10	1.93
Norway	0.30	0.69	0.44	0.42	0.77	0.50	1.10	2.10
New Zealand	0.15	0.66	0.35	0.32	0.76	0.43	1.10	1.86
Spain	-0.01	0.64	0.27	0.22	0.75	0.37	1.10	1.74

Note: Countries were sorted by real income per capita.

Table C.4. Continued

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Israel	0.32	0.69	0.46	0.43	0.77	0.52	1.10	2.17
Sweden	0.35	0.70	0.48	0.45	0.78	0.53	1.10	2.26
Ireland	0.23	0.68	0.41	0.37	0.77	0.47	1.10	1.97
Finland	0.33	0.69	0.47	0.44	0.78	0.52	1.10	2.19
Portugal	0.08	0.65	0.32	0.28	0.75	0.41	1.10	1.80
Greece	0.14	0.66	0.35	0.31	0.76	0.43	1.10	1.85
Slovenia	0.33	0.69	0.47	0.44	0.78	0.52	1.10	2.20
Czech Republic	0.36	0.70	0.49	0.46	0.78	0.54	1.10	2.30
Hungary	0.47	0.73	0.56	0.54	0.79	0.59	1.11	3.16
Mexico	0.43	0.72	0.53	0.51	0.79	0.57	1.11	2.70
Slovak Republic	0.46	0.72	0.55	0.53	0.79	0.59	1.11	3.10
Poland	0.50	0.74	0.58	0.56	0.80	0.61	1.11	3.98
Russian Federation	0.56	0.75	0.62	0.61	0.81	0.65	1.11	19.13
Average	0.22	0.68	0.40	0.37	0.77	0.47	1.10	2.66

Note: Countries were sorted by real income per capita.

Table C.5. Conditional income elasticities for food subgroups, 1999

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	0.32	0.50	0.16	-0.25	-0.24	0.68	1.31	1.48
United States	0.45	0.57	0.34	0.12	0.12	0.71	1.35	1.57
Switzerland	0.42	0.56	0.32	0.06	0.07	0.71	1.34	1.54
Cyprus	0.39	0.54	0.27	-0.03	-0.01	0.70	1.33	1.52
Austria	0.48	0.59	0.39	0.19	0.20	0.72	1.36	1.60
Iceland	0.48	0.59	0.40	0.20	0.21	0.72	1.37	1.61
Italy	0.49	0.60	0.41	0.22	0.23	0.73	1.37	1.62
Canada	0.53	0.63	0.46	0.32	0.33	0.74	1.40	1.70
Denmark	0.51	0.61	0.43	0.26	0.27	0.73	1.38	1.65
Germany	0.50	0.61	0.43	0.26	0.26	0.73	1.38	1.64
Australia	0.50	0.60	0.42	0.25	0.26	0.73	1.38	1.64
United Kingdom	0.49	0.60	0.41	0.22	0.23	0.73	1.37	1.62
Norway	0.54	0.63	0.47	0.34	0.34	0.74	1.40	1.72
France	0.51	0.61	0.43	0.27	0.27	0.73	1.38	1.65
Belgium	0.53	0.62	0.45	0.30	0.31	0.74	1.39	1.68
Netherlands	0.53	0.62	0.46	0.31	0.31	0.74	1.39	1.69
Japan	0.55	0.64	0.49	0.36	0.36	0.74	1.41	1.75
Spain	0.43	0.56	0.33	0.08	0.09	0.71	1.35	1.55
Ireland	0.48	0.59	0.40	0.21	0.21	0.72	1.37	1.61
New Zealand	0.53	0.62	0.45	0.30	0.31	0.74	1.39	1.68
Sweden	0.57	0.65	0.51	0.40	0.40	0.75	1.43	1.80
Greece	0.48	0.59	0.40	0.21	0.22	0.72	1.37	1.61
Portugal	0.52	0.62	0.45	0.30	0.30	0.74	1.39	1.68

Note: Countries were sorted by real income per capita.

Table C.5. Continued

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Finland	0.54	0.63	0.47	0.33	0.34	0.74	1.40	1.71
Israel	0.57	0.65	0.51	0.39	0.40	0.75	1.43	1.80
Slovenia	0.58	0.65	0.52	0.41	0.41	0.75	1.44	1.82
Korea	0.62	0.68	0.58	0.49	0.50	0.77	1.50	2.08
Czech Republic	0.56	0.64	0.50	0.37	0.37	0.75	1.42	1.76
Estonia	0.62	0.68	0.57	0.49	0.49	0.77	1.49	2.06
Hungary	0.62	0.68	0.57	0.48	0.48	0.77	1.49	2.03
Slovak Republic	0.59	0.66	0.54	0.43	0.44	0.76	1.45	1.88
Lithuania	0.63	0.69	0.59	0.50	0.51	0.77	1.51	2.13
Mexico	0.62	0.68	0.57	0.48	0.49	0.77	1.49	2.04
Poland	0.63	0.69	0.58	0.50	0.50	0.77	1.50	2.10
Bulgaria	0.70	0.74	0.67	0.62	0.62	0.80	1.74	4.59
Croatia	0.63	0.69	0.59	0.51	0.51	0.77	1.51	2.15
Latvia	0.66	0.71	0.63	0.56	0.56	0.78	1.59	2.61
Turkey	0.64	0.70	0.60	0.53	0.53	0.78	1.53	2.26
Macedonia	0.63	0.69	0.59	0.51	0.51	0.77	1.52	2.16
Russian Federation	0.69	0.73	0.66	0.60	0.60	0.79	1.68	3.61
Romania	0.67	0.72	0.64	0.58	0.58	0.79	1.63	2.94
Ukraine	0.71	0.75	0.69	0.64	0.64	0.81	1.85	11.46
Average	0.55	0.64	0.48	0.34	0.35	0.75	1.45	2.16

Note: Countries were sorted by real income per capita.

Table C.6. Unconditional income elasticities for food subgroups, 1985

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	0.01	0.00	-0.01	0.02	0.00	-0.01	0.00	-0.01
Canada	-0.05	0.05	0.21	-0.17	0.13	0.17	0.14	0.41
Luxembourg	-0.13	0.05	0.30	-0.38	0.19	0.24	0.21	0.54
France	-0.15	0.06	0.33	-0.42	0.21	0.27	0.23	0.61
Germany	-0.05	0.09	0.34	-0.19	0.22	0.28	0.23	0.71
Italy	-0.17	0.06	0.35	-0.47	0.23	0.29	0.24	0.65
Australia	-0.13	0.07	0.36	-0.37	0.23	0.29	0.25	0.67
Japan	0.00	0.11	0.36	-0.11	0.24	0.29	0.25	0.89
Belgium	-0.10	0.08	0.36	-0.30	0.24	0.30	0.25	0.71
Netherlands	-0.04	0.11	0.38	-0.18	0.25	0.31	0.26	0.84
Denmark	-0.04	0.11	0.39	-0.19	0.26	0.32	0.27	0.87
United Kingdom	-0.10	0.10	0.41	-0.32	0.27	0.33	0.28	0.81
New Zealand	-0.04	0.12	0.43	-0.20	0.28	0.35	0.30	0.94
Sweden	0.04	0.15	0.43	-0.05	0.28	0.35	0.30	1.30
Norway	0.02	0.15	0.43	-0.09	0.28	0.35	0.30	1.16
Austria	-0.10	0.10	0.43	-0.32	0.28	0.35	0.30	0.86
Finland	-0.02	0.14	0.48	-0.18	0.31	0.39	0.33	1.11
Spain	-0.16	0.10	0.48	-0.47	0.31	0.40	0.33	0.93
Greece	-0.08	0.15	0.58	-0.32	0.38	0.47	0.40	1.23
Ireland	0.02	0.20	0.62	-0.15	0.41	0.50	0.43	1.61
Portugal	0.13	0.26	0.65	0.02	0.43	0.52	0.45	3.10
Average	-0.05	0.11	0.40	-0.23	0.26	0.32	0.27	0.95

Note: Countries were sorted by real income per capita.

Table C.7. Unconditional income elasticities for food subgroups, 1990

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	0.03	-0.01	0.05	-0.13	0.07	0.07	0.03	0.13
Luxembourg	0.07	0.01	0.12	-0.18	0.17	0.16	0.06	0.31
Switzerland	0.09	-0.01	0.15	-0.35	0.21	0.20	0.07	0.36
Italy	0.11	-0.01	0.19	-0.39	0.27	0.25	0.09	0.47
Germany	0.13	0.04	0.19	-0.17	0.28	0.26	0.11	0.54
France	0.12	0.02	0.19	-0.21	0.28	0.26	0.11	0.52
Canada	0.14	0.05	0.21	-0.15	0.30	0.28	0.13	0.62
Belgium	0.14	0.03	0.22	-0.24	0.31	0.29	0.12	0.59
Japan	0.15	0.04	0.23	-0.20	0.32	0.30	0.13	0.64
Austria	0.15	0.02	0.24	-0.29	0.34	0.32	0.13	0.63
Iceland	0.16	0.06	0.24	-0.15	0.34	0.32	0.14	0.71
United Kingdom	0.15	0.01	0.24	-0.38	0.34	0.32	0.13	0.62
Denmark	0.17	0.07	0.25	-0.12	0.35	0.33	0.15	0.77
Netherlands	0.17	0.07	0.25	-0.12	0.36	0.33	0.15	0.78
Australia	0.17	0.04	0.26	-0.25	0.37	0.34	0.15	0.71
Sweden	0.20	0.11	0.28	-0.03	0.39	0.36	0.18	1.09
New Zealand	0.20	0.09	0.30	-0.12	0.42	0.39	0.18	0.95
Finland	0.21	0.10	0.31	-0.11	0.43	0.40	0.19	1.00
Norway	0.22	0.12	0.32	-0.07	0.45	0.42	0.20	1.14
Spain	0.21	0.02	0.33	-0.45	0.47	0.44	0.18	0.86
Portugal	0.26	0.09	0.38	-0.24	0.54	0.51	0.23	1.13
Ireland	0.27	0.10	0.40	-0.23	0.56	0.53	0.24	1.19
Greece	0.27	0.10	0.40	-0.23	0.57	0.53	0.24	1.22
Average	0.17	0.05	0.25	-0.21	0.35	0.33	0.15	0.74

Note: Countries were sorted by real income per capita.

Table C.8. Unconditional income elasticities for food subgroups, 1993

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	0.01	-0.06	-0.05	-0.03	-0.07	0.02	-0.04	-0.09
United States	0.00	-0.01	-0.01	-0.01	-0.02	0.00	-0.01	-0.02
Switzerland	0.00	0.15	0.15	0.08	0.20	-0.01	0.11	0.24
Belgium	0.00	0.23	0.21	0.12	0.29	-0.02	0.16	0.35
Japan	0.03	0.23	0.22	0.13	0.30	0.02	0.17	0.37
Germany	0.05	0.25	0.23	0.14	0.32	0.04	0.18	0.41
Canada	0.04	0.25	0.23	0.14	0.32	0.02	0.18	0.40
France	0.03	0.25	0.24	0.14	0.32	0.02	0.18	0.40
Italy	0.02	0.27	0.25	0.14	0.34	0.00	0.19	0.42
Netherlands	0.07	0.27	0.26	0.16	0.36	0.06	0.20	0.47
Austria	0.02	0.28	0.26	0.15	0.35	0.00	0.20	0.43
Australia	0.02	0.29	0.27	0.15	0.37	0.01	0.21	0.45
Iceland	0.05	0.31	0.29	0.17	0.40	0.04	0.22	0.50
United Kingdom	0.03	0.32	0.30	0.17	0.41	0.01	0.23	0.51
Denmark	0.06	0.32	0.30	0.18	0.42	0.05	0.23	0.53
Norway	0.08	0.34	0.32	0.19	0.45	0.06	0.25	0.57
New Zealand	0.07	0.36	0.34	0.20	0.47	0.05	0.26	0.59
Sweden	0.12	0.38	0.36	0.23	0.51	0.11	0.28	0.68
Spain	-0.03	0.41	0.38	0.20	0.51	-0.07	0.29	0.62
Portugal	0.00	0.41	0.38	0.21	0.52	-0.03	0.29	0.63
Finland	0.12	0.41	0.39	0.24	0.54	0.11	0.30	0.72
Greece	-0.05	0.42	0.40	0.21	0.53	-0.08	0.30	0.64
Ireland	0.09	0.43	0.40	0.24	0.56	0.07	0.31	0.71
Average	0.04	0.28	0.27	0.15	0.37	0.02	0.21	0.46

Note: Countries were sorted by real income per capita.

Table C.9. Unconditional income elasticities for food subgroups, 1996

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	-0.04	0.29	0.11	0.08	0.34	0.16	0.51	0.79
Luxembourg	-0.11	0.28	0.07	0.04	0.34	0.13	0.51	0.77
Switzerland	-0.01	0.34	0.14	0.11	0.39	0.19	0.58	0.92
Japan	0.13	0.36	0.22	0.20	0.41	0.26	0.59	1.06
Belgium	0.05	0.35	0.18	0.15	0.41	0.22	0.59	0.98
Germany	0.12	0.37	0.22	0.20	0.42	0.25	0.60	1.06
Canada	0.08	0.36	0.19	0.17	0.42	0.24	0.60	1.02
Australia	0.06	0.36	0.19	0.16	0.42	0.23	0.61	1.01
Iceland	0.09	0.37	0.20	0.18	0.42	0.24	0.61	1.04
Netherlands	0.14	0.38	0.23	0.22	0.43	0.27	0.61	1.12
Austria	0.06	0.37	0.19	0.17	0.42	0.24	0.62	1.02
Italy	0.10	0.37	0.21	0.19	0.43	0.25	0.62	1.06
Denmark	0.13	0.38	0.23	0.21	0.43	0.27	0.62	1.11
France	0.09	0.37	0.20	0.18	0.43	0.25	0.62	1.05
United Kingdom	0.12	0.39	0.22	0.20	0.44	0.27	0.63	1.11
Norway	0.17	0.40	0.26	0.24	0.45	0.29	0.64	1.21
New Zealand	0.08	0.38	0.21	0.18	0.44	0.25	0.64	1.08
Spain	-0.01	0.38	0.16	0.13	0.44	0.22	0.65	1.04

Note: Countries were sorted by real income per capita.

Table C.9. Continued

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Israel	0.19	0.41	0.28	0.26	0.46	0.31	0.66	1.29
Sweden	0.21	0.42	0.29	0.27	0.46	0.32	0.66	1.35
Ireland	0.14	0.41	0.25	0.23	0.46	0.29	0.67	1.19
Finland	0.20	0.42	0.28	0.27	0.47	0.32	0.67	1.33
Portugal	0.05	0.40	0.19	0.17	0.46	0.25	0.67	1.09
Greece	0.09	0.40	0.21	0.19	0.46	0.26	0.67	1.13
Slovenia	0.21	0.44	0.30	0.28	0.49	0.33	0.70	1.39
Czech Republic	0.23	0.45	0.31	0.30	0.50	0.35	0.71	1.48
Hungary	0.31	0.49	0.37	0.36	0.53	0.40	0.74	2.12
Mexico	0.29	0.48	0.36	0.34	0.53	0.39	0.75	1.82
Slovak Republic	0.32	0.50	0.38	0.37	0.54	0.40	0.76	2.12
Poland	0.34	0.51	0.40	0.39	0.55	0.42	0.76	2.73
Russian Federation	0.39	0.52	0.43	0.42	0.56	0.45	0.77	13.25
Average	0.14	0.40	0.24	0.22	0.45	0.28	0.65	1.64

Note: Countries were sorted by real income per capita.

Table C.10. Unconditional income elasticities for food subgroups, 1999

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	0.15	0.23	0.07	-0.12	-0.11	0.31	0.60	0.67
United States	0.21	0.27	0.16	0.05	0.06	0.34	0.64	0.74
Switzerland	0.23	0.30	0.17	0.03	0.04	0.38	0.72	0.83
Cyprus	0.21	0.29	0.15	-0.01	-0.01	0.38	0.72	0.82
Austria	0.26	0.33	0.21	0.11	0.11	0.40	0.76	0.89
Iceland	0.27	0.33	0.22	0.11	0.12	0.40	0.76	0.90
Italy	0.27	0.33	0.23	0.12	0.13	0.40	0.76	0.90
Canada	0.30	0.36	0.26	0.18	0.19	0.42	0.80	0.97
Denmark	0.29	0.35	0.25	0.15	0.15	0.42	0.79	0.94
Germany	0.29	0.35	0.24	0.15	0.15	0.42	0.79	0.94
Australia	0.29	0.35	0.24	0.14	0.15	0.42	0.79	0.94
United Kingdom	0.28	0.34	0.23	0.13	0.13	0.42	0.79	0.93
Norway	0.31	0.36	0.27	0.19	0.20	0.43	0.81	0.99
France	0.30	0.35	0.25	0.16	0.16	0.43	0.80	0.96
Belgium	0.31	0.36	0.26	0.18	0.18	0.43	0.81	0.98
Netherlands	0.31	0.36	0.27	0.18	0.18	0.43	0.82	0.99
Japan	0.33	0.38	0.29	0.21	0.22	0.44	0.84	1.04
Spain	0.26	0.34	0.20	0.05	0.05	0.42	0.80	0.93
Ireland	0.29	0.35	0.24	0.12	0.13	0.43	0.82	0.96
New Zealand	0.32	0.37	0.27	0.18	0.19	0.44	0.84	1.01
Sweden	0.34	0.39	0.31	0.24	0.24	0.45	0.86	1.09
Greece	0.29	0.36	0.24	0.13	0.13	0.44	0.83	0.98
Portugal	0.32	0.38	0.27	0.18	0.18	0.45	0.84	1.02

Note: Countries were sorted by real income per capita.

Table C.10. Continued

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Finland	0.33	0.39	0.29	0.21	0.21	0.46	0.86	1.06
Israel	0.36	0.40	0.32	0.25	0.25	0.47	0.89	1.12
Slovenia	0.37	0.42	0.33	0.26	0.26	0.48	0.92	1.16
Korea	0.40	0.44	0.37	0.32	0.32	0.50	0.97	1.35
Czech Republic	0.36	0.42	0.32	0.24	0.24	0.48	0.92	1.14
Estonia	0.42	0.46	0.39	0.33	0.33	0.52	1.01	1.39
Hungary	0.42	0.46	0.38	0.32	0.33	0.52	1.00	1.37
Slovak Republic	0.40	0.45	0.36	0.29	0.30	0.51	0.98	1.27
Lithuania	0.43	0.47	0.40	0.35	0.35	0.53	1.03	1.46
Mexico	0.42	0.47	0.39	0.33	0.33	0.52	1.02	1.39
Poland	0.43	0.47	0.40	0.34	0.34	0.53	1.03	1.44
Bulgaria	0.48	0.51	0.46	0.42	0.42	0.55	1.19	3.15
Croatia	0.44	0.48	0.41	0.35	0.35	0.54	1.05	1.49
Latvia	0.46	0.50	0.44	0.39	0.39	0.55	1.11	1.82
Turkey	0.45	0.49	0.42	0.37	0.37	0.55	1.08	1.59
Macedonia	0.45	0.49	0.42	0.36	0.36	0.55	1.07	1.53
Russian Federation	0.50	0.53	0.48	0.44	0.44	0.58	1.22	2.62
Romania	0.49	0.52	0.47	0.42	0.42	0.57	1.18	2.13
Ukraine	0.53	0.56	0.51	0.48	0.48	0.60	1.37	8.50
Average	0.35	0.40	0.31	0.22	0.23	0.46	0.90	1.39

Note: Countries were sorted by real income per capita.

Table C.11. Unconditional Frisch own-price elasticities for food subgroups, 1985

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.01
Canada	0.03	-0.03	-0.13	0.10	-0.08	-0.11	-0.09	-0.26
Luxembourg	0.08	-0.03	-0.19	0.24	-0.12	-0.15	-0.13	-0.34
France	0.09	-0.04	-0.21	0.27	-0.13	-0.17	-0.14	-0.38
Germany	0.03	-0.06	-0.21	0.12	-0.14	-0.17	-0.15	-0.45
Italy	0.10	-0.04	-0.22	0.30	-0.14	-0.18	-0.15	-0.41
Australia	0.08	-0.04	-0.22	0.23	-0.14	-0.18	-0.15	-0.42
Japan	0.00	-0.07	-0.23	0.07	-0.15	-0.18	-0.16	-0.56
Belgium	0.06	-0.05	-0.23	0.19	-0.15	-0.19	-0.16	-0.45
Netherlands	0.02	-0.07	-0.24	0.11	-0.16	-0.19	-0.17	-0.53
Denmark	0.02	-0.07	-0.25	0.12	-0.16	-0.20	-0.17	-0.55
United Kingdom	0.06	-0.06	-0.26	0.20	-0.17	-0.21	-0.18	-0.51
New Zealand	0.03	-0.08	-0.27	0.13	-0.17	-0.22	-0.19	-0.59
Sweden	-0.03	-0.10	-0.27	0.03	-0.18	-0.22	-0.19	-0.81
Norway	-0.01	-0.09	-0.27	0.06	-0.18	-0.22	-0.19	-0.73
Austria	0.06	-0.06	-0.27	0.20	-0.18	-0.22	-0.19	-0.54
Finland	0.01	-0.09	-0.30	0.11	-0.20	-0.24	-0.21	-0.70
Spain	0.10	-0.06	-0.30	0.30	-0.20	-0.25	-0.21	-0.58
Greece	0.05	-0.10	-0.36	0.20	-0.24	-0.30	-0.25	-0.77
Ireland	-0.01	-0.13	-0.39	0.09	-0.26	-0.32	-0.27	-1.01
Portugal	-0.08	-0.16	-0.41	-0.02	-0.27	-0.33	-0.28	-1.95
Average	0.03	-0.07	-0.25	0.15	-0.16	-0.20	-0.17	-0.60

Note: Countries were sorted by real income per capita.

Table C.12. Unconditional Frisch own-price elasticities for food subgroups, 1990

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	-0.02	0.00	-0.03	0.08	-0.04	-0.04	-0.02	-0.08
Luxembourg	-0.04	0.00	-0.07	0.11	-0.10	-0.10	-0.04	-0.18
Switzerland	-0.05	0.01	-0.09	0.21	-0.13	-0.12	-0.04	-0.22
Italy	-0.07	0.01	-0.11	0.24	-0.16	-0.15	-0.06	-0.28
Germany	-0.08	-0.02	-0.12	0.10	-0.17	-0.16	-0.07	-0.33
France	-0.07	-0.01	-0.12	0.13	-0.17	-0.16	-0.06	-0.31
Canada	-0.09	-0.03	-0.13	0.09	-0.18	-0.17	-0.08	-0.37
Belgium	-0.08	-0.02	-0.13	0.14	-0.19	-0.17	-0.07	-0.35
Japan	-0.09	-0.02	-0.14	0.12	-0.19	-0.18	-0.08	-0.38
Austria	-0.09	-0.01	-0.14	0.18	-0.20	-0.19	-0.08	-0.38
Iceland	-0.10	-0.03	-0.14	0.09	-0.20	-0.19	-0.09	-0.43
United Kingdom	-0.09	0.00	-0.15	0.23	-0.21	-0.19	-0.08	-0.37
Denmark	-0.10	-0.04	-0.15	0.07	-0.21	-0.20	-0.09	-0.46
Netherlands	-0.10	-0.04	-0.15	0.07	-0.21	-0.20	-0.09	-0.47
Australia	-0.10	-0.02	-0.16	0.15	-0.22	-0.21	-0.09	-0.43
Sweden	-0.12	-0.07	-0.17	0.02	-0.23	-0.22	-0.11	-0.65
New Zealand	-0.12	-0.05	-0.18	0.07	-0.25	-0.24	-0.11	-0.57
Finland	-0.13	-0.06	-0.18	0.07	-0.26	-0.24	-0.12	-0.60
Norway	-0.13	-0.07	-0.19	0.04	-0.27	-0.25	-0.12	-0.69
Spain	-0.12	-0.01	-0.20	0.27	-0.28	-0.26	-0.11	-0.52
Portugal	-0.15	-0.06	-0.23	0.15	-0.33	-0.31	-0.14	-0.68
Ireland	-0.16	-0.06	-0.24	0.14	-0.34	-0.32	-0.14	-0.72
Greece	-0.16	-0.06	-0.24	0.14	-0.34	-0.32	-0.15	-0.73
Average	-0.10	-0.03	-0.15	0.13	-0.21	-0.20	-0.09	-0.44

Note: Countries were sorted by real income per capita.

Table C.13. Unconditional Frisch own-price elasticities for food subgroups, 1993

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	-0.01	0.03	0.03	0.01	0.04	-0.01	0.02	0.04
United States	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01
Switzerland	0.00	-0.08	-0.07	-0.04	-0.10	0.01	-0.06	-0.12
Belgium	0.00	-0.11	-0.11	-0.06	-0.15	0.01	-0.08	-0.18
Japan	-0.02	-0.12	-0.11	-0.06	-0.15	-0.01	-0.08	-0.19
Germany	-0.03	-0.13	-0.12	-0.07	-0.16	-0.02	-0.09	-0.21
Canada	-0.02	-0.13	-0.12	-0.07	-0.16	-0.01	-0.09	-0.20
France	-0.02	-0.13	-0.12	-0.07	-0.16	-0.01	-0.09	-0.20
Italy	-0.01	-0.14	-0.13	-0.07	-0.17	0.00	-0.10	-0.21
Netherlands	-0.04	-0.14	-0.13	-0.08	-0.18	-0.03	-0.10	-0.24
Austria	-0.01	-0.14	-0.13	-0.07	-0.18	0.00	-0.10	-0.22
Australia	-0.01	-0.15	-0.14	-0.08	-0.19	0.00	-0.11	-0.23
Iceland	-0.03	-0.16	-0.15	-0.09	-0.20	-0.02	-0.11	-0.25
United Kingdom	-0.02	-0.16	-0.15	-0.09	-0.21	-0.01	-0.12	-0.26
Denmark	-0.03	-0.16	-0.15	-0.09	-0.21	-0.02	-0.12	-0.27
Norway	-0.04	-0.17	-0.16	-0.10	-0.23	-0.03	-0.13	-0.29
New Zealand	-0.04	-0.18	-0.17	-0.10	-0.24	-0.03	-0.13	-0.30
Sweden	-0.06	-0.19	-0.18	-0.12	-0.26	-0.06	-0.14	-0.35
Spain	0.02	-0.21	-0.19	-0.10	-0.26	0.04	-0.15	-0.31
Portugal	0.00	-0.21	-0.19	-0.11	-0.26	0.01	-0.15	-0.32
Finland	-0.06	-0.21	-0.20	-0.12	-0.27	-0.05	-0.15	-0.37
Greece	0.02	-0.21	-0.20	-0.11	-0.27	0.04	-0.15	-0.32
Ireland	-0.04	-0.22	-0.20	-0.12	-0.28	-0.03	-0.16	-0.36
Average	-0.02	-0.14	-0.13	-0.08	-0.18	-0.01	-0.10	-0.23

Note: Countries were sorted by real income per capita.

Table C.14. Unconditional Frisch own-price elasticities for food subgroups, 1996

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
United States	0.03	-0.20	-0.07	-0.06	-0.24	-0.11	-0.35	-0.55
Luxembourg	0.08	-0.20	-0.05	-0.03	-0.24	-0.09	-0.35	-0.54
Switzerland	0.01	-0.23	-0.10	-0.08	-0.27	-0.13	-0.40	-0.64
Japan	-0.09	-0.25	-0.15	-0.14	-0.29	-0.18	-0.41	-0.74
Belgium	-0.04	-0.25	-0.12	-0.11	-0.28	-0.16	-0.41	-0.68
Germany	-0.08	-0.26	-0.15	-0.14	-0.29	-0.18	-0.42	-0.74
Canada	-0.05	-0.25	-0.13	-0.12	-0.29	-0.16	-0.42	-0.71
Australia	-0.04	-0.25	-0.13	-0.11	-0.29	-0.16	-0.42	-0.70
Iceland	-0.06	-0.26	-0.14	-0.12	-0.29	-0.17	-0.42	-0.72
Netherlands	-0.10	-0.26	-0.16	-0.15	-0.30	-0.19	-0.43	-0.78
Austria	-0.04	-0.26	-0.13	-0.12	-0.29	-0.16	-0.43	-0.71
Italy	-0.07	-0.26	-0.14	-0.13	-0.30	-0.17	-0.43	-0.74
Denmark	-0.09	-0.26	-0.16	-0.15	-0.30	-0.19	-0.43	-0.77
France	-0.06	-0.26	-0.14	-0.13	-0.30	-0.17	-0.43	-0.73
United Kingdom	-0.08	-0.27	-0.16	-0.14	-0.31	-0.19	-0.44	-0.77
Norway	-0.12	-0.28	-0.18	-0.17	-0.31	-0.20	-0.44	-0.85
New Zealand	-0.06	-0.27	-0.14	-0.13	-0.31	-0.18	-0.45	-0.75
Spain	0.00	-0.27	-0.11	-0.09	-0.31	-0.15	-0.46	-0.73

Note: Countries were sorted by real income per capita.

Table C.14. Continued

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Israel	-0.13	-0.29	-0.19	-0.18	-0.32	-0.22	-0.46	-0.90
Sweden	-0.15	-0.29	-0.20	-0.19	-0.32	-0.22	-0.46	-0.94
Ireland	-0.10	-0.29	-0.17	-0.16	-0.32	-0.20	-0.46	-0.83
Finland	-0.14	-0.29	-0.20	-0.19	-0.33	-0.22	-0.47	-0.93
Portugal	-0.04	-0.28	-0.14	-0.12	-0.32	-0.17	-0.46	-0.76
Greece	-0.06	-0.28	-0.15	-0.13	-0.32	-0.18	-0.47	-0.79
Slovenia	-0.15	-0.31	-0.21	-0.19	-0.34	-0.23	-0.49	-0.97
Czech Republic	-0.16	-0.31	-0.22	-0.21	-0.35	-0.24	-0.50	-1.03
Hungary	-0.22	-0.34	-0.26	-0.25	-0.37	-0.28	-0.52	-1.48
Mexico	-0.20	-0.34	-0.25	-0.24	-0.37	-0.27	-0.52	-1.27
Slovak Republic	-0.22	-0.35	-0.26	-0.25	-0.38	-0.28	-0.53	-1.48
Poland	-0.24	-0.35	-0.28	-0.27	-0.38	-0.29	-0.53	-1.91
Russian Federation	-0.27	-0.36	-0.30	-0.30	-0.39	-0.32	-0.54	-9.25
Average	-0.10	-0.28	-0.17	-0.15	-0.31	-0.20	-0.45	-1.14

Note: Countries were sorted by real income per capita.

Table C.15. Unconditional Frisch own-price elasticities for food subgroups, 1999

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Luxembourg	-0.11	-0.17	-0.05	0.09	0.08	-0.23	-0.45	-0.50
United States	-0.16	-0.20	-0.12	-0.04	-0.04	-0.25	-0.48	-0.55
Switzerland	-0.17	-0.22	-0.13	-0.02	-0.03	-0.28	-0.54	-0.62
Cyprus	-0.16	-0.22	-0.11	0.01	0.01	-0.28	-0.54	-0.62
Austria	-0.20	-0.24	-0.16	-0.08	-0.08	-0.30	-0.56	-0.66
Iceland	-0.20	-0.25	-0.16	-0.09	-0.09	-0.30	-0.57	-0.67
Italy	-0.20	-0.25	-0.17	-0.09	-0.10	-0.30	-0.57	-0.67
Canada	-0.23	-0.27	-0.20	-0.14	-0.14	-0.31	-0.60	-0.72
Denmark	-0.22	-0.26	-0.18	-0.11	-0.11	-0.31	-0.59	-0.71
Germany	-0.22	-0.26	-0.18	-0.11	-0.11	-0.31	-0.59	-0.71
Australia	-0.22	-0.26	-0.18	-0.11	-0.11	-0.31	-0.59	-0.70
United Kingdom	-0.21	-0.26	-0.17	-0.10	-0.10	-0.31	-0.59	-0.70
Norway	-0.23	-0.27	-0.20	-0.15	-0.15	-0.32	-0.61	-0.74
France	-0.22	-0.27	-0.19	-0.12	-0.12	-0.32	-0.60	-0.72
Belgium	-0.23	-0.27	-0.20	-0.13	-0.13	-0.32	-0.61	-0.73
Netherlands	-0.23	-0.27	-0.20	-0.13	-0.14	-0.32	-0.61	-0.74
Japan	-0.25	-0.28	-0.22	-0.16	-0.16	-0.33	-0.63	-0.78
Spain	-0.19	-0.25	-0.15	-0.04	-0.04	-0.32	-0.60	-0.69
Ireland	-0.22	-0.27	-0.18	-0.09	-0.10	-0.32	-0.61	-0.72
New Zealand	-0.24	-0.28	-0.20	-0.14	-0.14	-0.33	-0.63	-0.76
Sweden	-0.26	-0.29	-0.23	-0.18	-0.18	-0.34	-0.65	-0.81
Greece	-0.22	-0.27	-0.18	-0.09	-0.10	-0.33	-0.62	-0.73
Portugal	-0.24	-0.28	-0.20	-0.13	-0.14	-0.33	-0.63	-0.76

Note: Countries were sorted by real income per capita.

Table C.15. Continued

Country	Cereals and Bread	Meat and Fish	Dairy	Fats and Oil	Fruit and Vegetables	Other Foods	Beverages and Tobacco	Food away from home
Finland	-0.25	-0.29	-0.22	-0.15	-0.16	-0.34	-0.65	-0.79
Israel	-0.27	-0.30	-0.24	-0.18	-0.19	-0.35	-0.67	-0.84
Slovenia	-0.27	-0.31	-0.25	-0.19	-0.20	-0.36	-0.68	-0.87
Korea	-0.30	-0.33	-0.28	-0.24	-0.24	-0.37	-0.72	-1.01
Czech Republic	-0.27	-0.31	-0.24	-0.18	-0.18	-0.36	-0.69	-0.85
Estonia	-0.31	-0.34	-0.29	-0.25	-0.25	-0.39	-0.75	-1.04
Hungary	-0.31	-0.34	-0.29	-0.24	-0.24	-0.39	-0.75	-1.02
Slovak Republic	-0.30	-0.33	-0.27	-0.22	-0.22	-0.38	-0.73	-0.95
Lithuania	-0.32	-0.35	-0.30	-0.26	-0.26	-0.39	-0.77	-1.09
Mexico	-0.32	-0.35	-0.29	-0.25	-0.25	-0.39	-0.76	-1.04
Poland	-0.32	-0.35	-0.30	-0.26	-0.26	-0.39	-0.77	-1.08
Bulgaria	-0.36	-0.38	-0.34	-0.32	-0.32	-0.41	-0.89	-2.35
Croatia	-0.33	-0.36	-0.31	-0.26	-0.26	-0.40	-0.79	-1.12
Latvia	-0.35	-0.37	-0.33	-0.29	-0.29	-0.41	-0.83	-1.36
Turkey	-0.34	-0.37	-0.32	-0.28	-0.28	-0.41	-0.81	-1.19
Macedonia	-0.33	-0.36	-0.31	-0.27	-0.27	-0.41	-0.80	-1.14
Russian Federation	-0.37	-0.40	-0.36	-0.33	-0.33	-0.43	-0.91	-1.96
Romania	-0.37	-0.39	-0.35	-0.32	-0.32	-0.43	-0.88	-1.59
Ukraine	-0.39	-0.42	-0.38	-0.36	-0.36	-0.45	-1.02	-6.35
Average	-0.26	-0.30	-0.23	-0.17	-0.17	-0.35	-0.67	-1.04

Note: Countries were sorted by real income per capita.

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